AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

AUGUST 1, 1950

In This Issue . . .

Russia's Industrial Strength

Studebaker Automatic Transmission Production

Features of Reo Military Truck

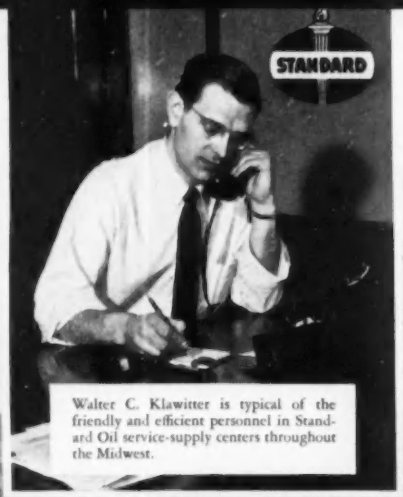
Bonding Aircraft with Metal Adhesives

Electronic Brain Schedules Production

Complete Table of Contents, Page 3

A CHILTON PUBLICATION

Easy local call . . .



Walter C. Klawitter is typical of the friendly and efficient personnel in Standard Oil service-supply centers throughout the Midwest.

3 IMPORTANT ADVANTAGES

Standard Oil's Lubrication Service is especially geared to serve your midwest operations.

1 **Service-supply points** are near your plant. You are assured of fast deliveries, prompt lubrication engineering service.

2 **Lubrication specialists** have been specifically trained in Standard Oil Lubrication Engineering Schools to help you obtain the maximum benefits from lubricants and fuels.

3 **Research and technical facilities** are geared to help solve your specific lubrication problems.

Fast local delivery

● Anywhere in the Midwest; a simple, local phone call will bring you any petroleum product you need—double-quick! Here's why: a service-distribution set-up—unique in the oil industry—has a Standard Oil office and warehouse located practically in your own backyard! Adequate stocks of the lubricants and fuels required for the efficient operation of your plant are warehoused at that service-supply center. You can always get the product you need—*when* you need it—delivered right to your door.

Here, too, are the local headquarters for a Standard Oil lubrication specialist. He is close at hand, will give you on-the-spot engineering service. He has plenty of practical experience. He has been specially trained for his job in a Standard Oil Lubrication Engineering School. He is backed by Standard Oil's extensive research and technical facilities.

Let this lubrication specialist and Standard Oil's efficient supply service help you make real savings. Phone your local Standard Oil (Indiana) service-supply center* today.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

***Service-supply centers are located throughout: Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Montana, Missouri, Nebraska, North Dakota, South Dakota, Oklahoma, Wisconsin, Wyoming.**

STANDARD OIL COMPANY (INDIANA) STANDARD

Cotta makes

REDUCTION UNITS, TOO

Available in a broad range of ratios . . . COTTA reduction units are found in many industrial applications . . . cranes, shovels, rock crushers, generators, pumps, and the like. Particularly suited for adjusting high-speed Diesel output to the r.p.m. of slower-speed units. Input torque ranges from 150 foot pounds to 1350 foot pounds. COTTA precision-engineering throughout.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA
HEAVY-DUTY
TRANSMISSIONS
"Engineered-to-order"

Maintain Operating Accuracy

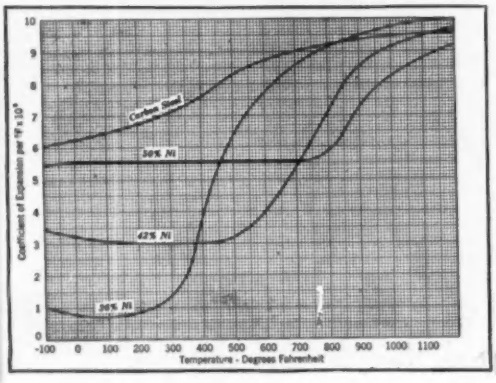
BY USING

Iron-Nickel Alloys

TO CONTROL THERMAL EXPANSION

Any desired coefficient of expansion, ranging from almost zero to a value greater than that of ordinary steel, may be obtained with the iron-nickel alloys. In addition, these alloys are strong, tough, ductile and possess a useful degree of corrosion resistance.

In wide use is a 36% nickel alloy... aptly named "Invar" because its dimensions remain almost *invariable* over the range of atmospheric temperature variations. However, as nickel content goes higher, expansion increases continuously. The chart, below, shows the thermal expansion characteristics of Invar and two other high nickel alloys, along with those of carbon steel for comparison.



FABRICATION

Like all austenitic alloys, those of the iron-nickel system respond well to plastic deformation, either hot or cold. They may be welded by any of the commonly used methods, and users report their machining characteristics are very similar to those of other high nickel alloys such as Monel® and Inconel®. A special, free-cutting grade is available to meet exacting machining requirements.

APPLICATIONS

Where dimensional changes with temperature must be minimized, or where such changes must approximate those of other materials of relatively low expansivity, iron-nickel alloys... sometimes modified by other alloying elements... are almost universally used.

For example... in thermostatic bimetal strip, Invar serves as the low expansion side for use up to moderately elevated temperatures. At higher temperatures, the 42% nickel alloy is commonly used. For the high expansion side, special alloys, containing 15-25% nickel, are used extensively because they develop nearly double the expansivity of iron. Iron-nickel alloys are also widely used in glass-to-metal seals, where expansivity of the glass must be closely matched. The 42% nickel alloy, sometimes with added chromium, is used with soft glasses. Hard glasses call for nickel alloys containing added cobalt.

Scores of other iron-nickel alloy applications include bases for giant telescopes, surveyors' tapes, radio condensers, parts for textile machinery and for numerous precision instruments and devices.

Industrial fields of usefulness for the iron-nickel alloys are far from exhausted. These unique materials can be of incalculable value in improving instrumentation and process control, and in the design of new devices. They are available in various forms including wire, rod, strip, sheet, bars and tubing. Send coupon today for additional information on the properties of iron-nickel alloys... they may be the means of improving your products, equipment, or process.

EMBLEM OF INCO SERVICE TRADE MARK

The International Nickel Company, Inc.
Dept. AI, 67 Wall St., New York 5, N. Y.

Please send me further information about Iron-Nickel Alloys.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

August 1, 1950 Vol. 103, No. 3

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HEATING, COOLING, AND AIR CONDITIONING PRODUCTS FOR HOME AND INDUSTRY.

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Plants at Racine, Wisconsin and Mattoon, Illinois

DISCOVER FOR YOURSELF NEW HEAT TRANSFER ECONOMY

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Rush me the facts about your ☐ Fixed ☐ Removable Tube Bundle Heat Exchangers, without obligation.

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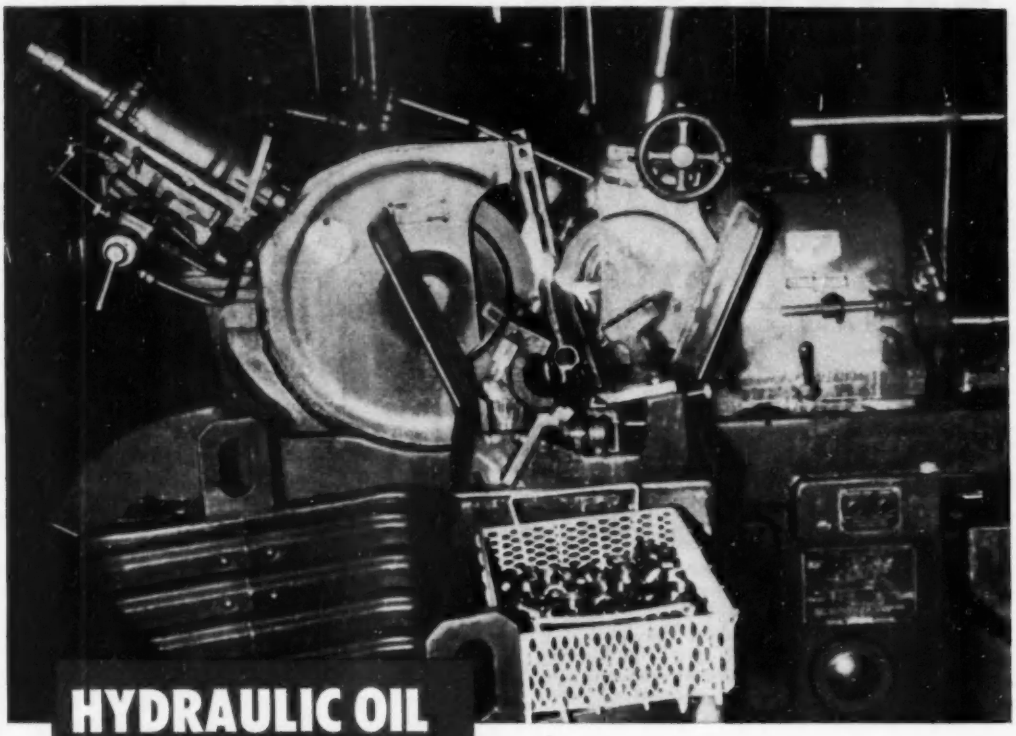


HYDRAULIC OIL CONSUMPTION REDUCED 74%*

by changing to Texaco Regal Oils (R&O)

A large midwestern plant is making this saving on some eighty hydraulically operated grinders, many of them used for grinding ball bearing races. With the exception of small amounts of make-up, some of the machines have run over a year on their original fills of *Texaco Regal Oils (R & O)*.

This 74% saving in hydraulic oil consumption is only one of the advantages this plant gains by its change to *Texaco Regal Oils (R & O)*. Others are smoother hydraulic operation, longer pump life, less machine downtime, lower maintenance costs.

Texaco Regal Oils (R & O) are highly refined turbine-grade oils inhibited against rust and oxidation and processed to prevent foaming. They are approved by leading hydraulic manufacturers, many of whom ship their units already charged with these outstanding oils.

A Texaco Lubrication Engineer will gladly give you the name of the plant where these savings are being made, and help you make important savings in *your* plant. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

*Name of this Texaco user on request

TEXACO

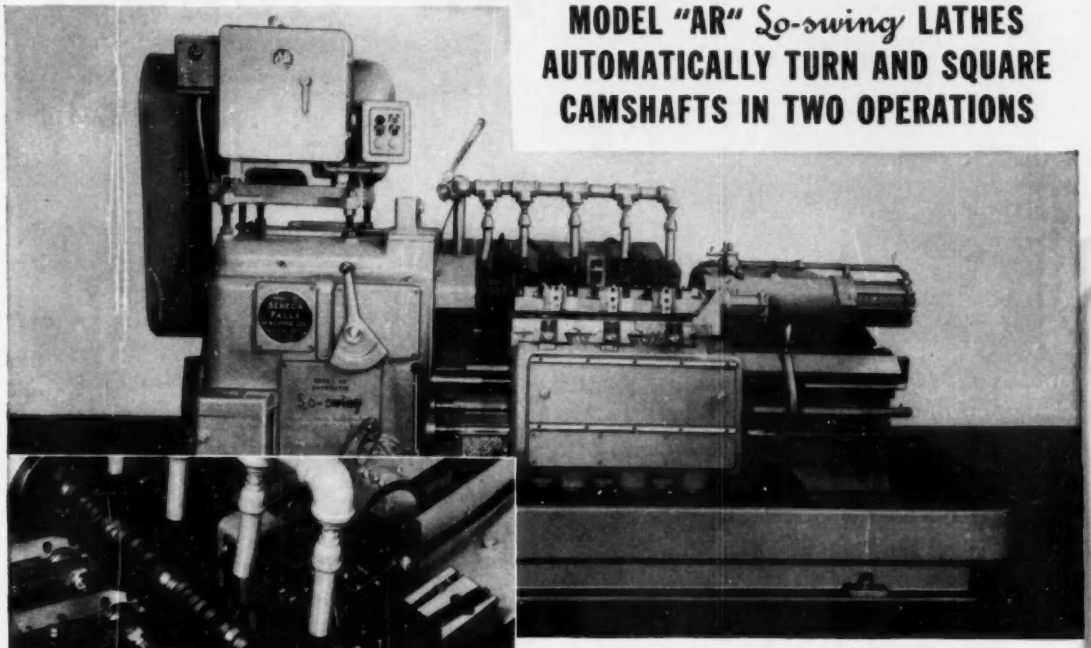
TEXACO Regal Oils (R&O)

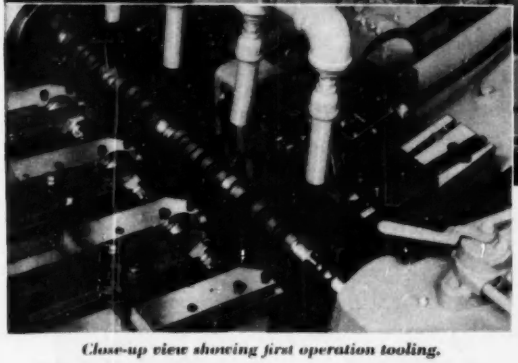
FOR ALL HYDRAULIC UNITS

MACHINE OF THE MONTH

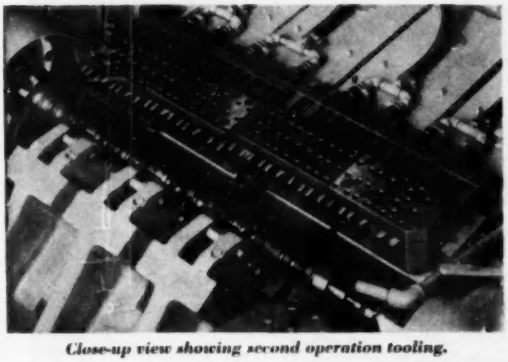
PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

MODEL "AR" *Lo-swing* LATHES AUTOMATICALLY TURN AND SQUARE CAMSHAFTS IN TWO OPERATIONS





Close-up view showing first operation tooling.



Close-up view showing second operation tooling.

Problem: To turn and square automatically forged steel camshafts in two operations.

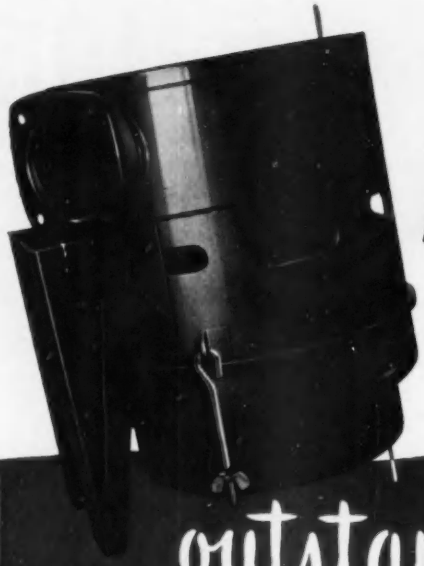
Solution: Two Model "AR" Lo-swing Automatic Lathes were selected for this job. In the first operation, the camshafts are delivered to the machine centered on both ends and with the pump gear diameter ground to size, thus providing a finished spotting for a two-roll steady rest, which is automatically advanced to support the shaft when the machine cycle is started. Four tools on the front carriage finish turn the line bearings, after which three steady rests automatically move into contact with the work and support it while the rear tools face and chamfer the line bearings. The entire operation is automatic and electrically controlled safety devices automatically withdraw the slides if for any reason the bearings are not turned to size.

In the second operation, the piece is reversed and driven from the opposite end with a 3-jaw, air-operated chuck. Three fixed Steady Rests support the work on the previously-turned line bearings. Two tools on the front carriage turn the unmachined end while thirty-four tools mounted on four Rear Slides square all cam lobes and the one end bearing. Rear Slide movements are staggered so that cutting pressure is limited to the tools of only one slide at a time.

Let Seneca Falls assist on *your* turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*



UNITED Air Cleaner

Helps WHITE TRUCKS Achieve...

outstanding mileage

United Oil Bath Air Cleaners have helped measurably in building the high mileage records for which White trucks are noted. Equipped with efficient United cleaners, these "million mile favorites of transport operators" are protected against every kind of abrasive harmful to the delicate internal parts of an engine—from fine desert alkali to city soot. This protection adds miles of life to rings, pistons, sleeves and bearings.

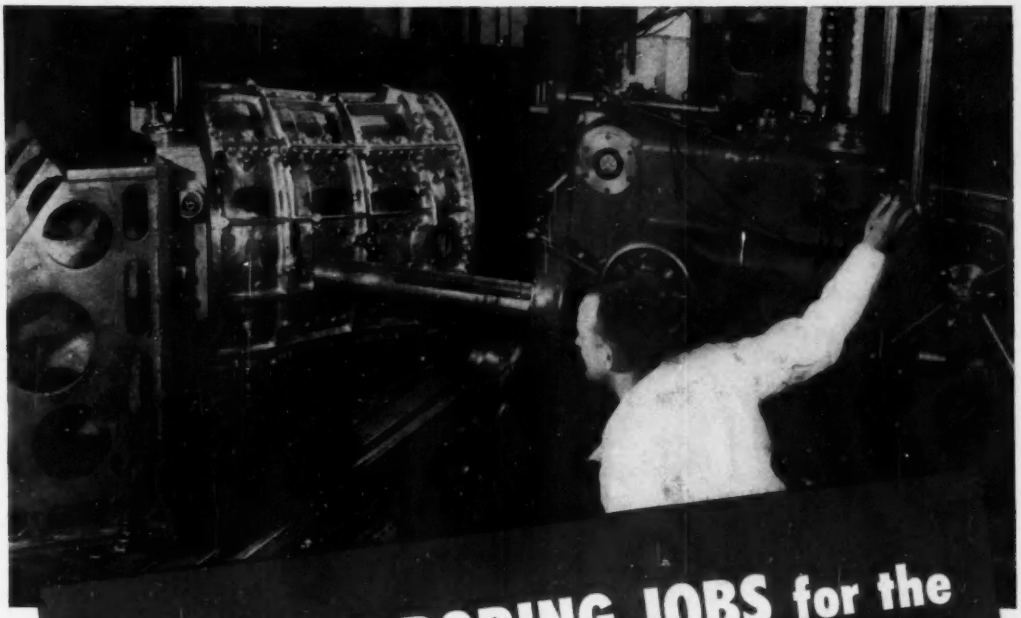
Trucks, cars, tractors, stationary and portable engines have benefited from United Oil Bath Air Cleaner protection for almost 30 years. With over 260 models available, there is a United Oil Bath Air Cleaner for every type of internal combustion engine. Our sales engineers can help you with up-to-the-minute counsel on your design problems.

Shown here is White's "first choice of the past"—the Model WC 285 truck. The United Oil Bath Air Cleaner illustrated is standard equipment for this unit.

UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28, Mitchell Division — Philadelphia 36

AIR CLEANERS • METAL STAMPINGS • DOVETAILS •
IGNITION AND TURN SIGNAL SWITCHES • ROLLED SHAPES



PRECISION BORING JOBS for the Famous "ORENDA" Jet Engine

The A. V. Roe Company at Malton, Ontario, find Universal Boring Machines, which are now built by The Bullard Company, ideal for varied machining operations on this exacting work.

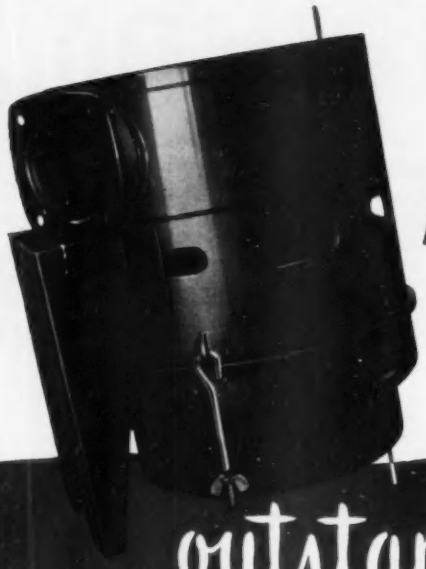
The above illustration shows the machining of a Compressor Housing, one of many operations which these machines accurately perform.

Particular advantages of the Bullard-Universal Boring Machines are their versatility and simplified right hand operation.

Close tolerances are absolutely essential in the building of this Jet Engine, and here again Bullard-Universal gives that desired accuracy.

Investigate these machines to increase production and accuracy on precision work

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT, U. S. A.



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Helps WHITE TRUCKS Achieve...

outstanding mileage

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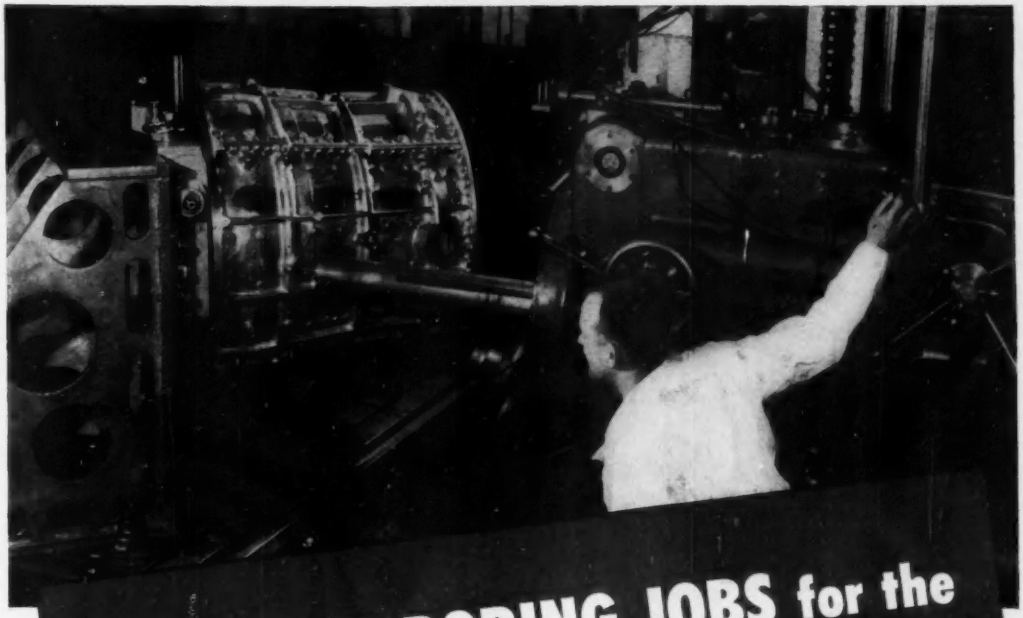
UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicago 28, Mitchell Division — Philadelphia 36

AIR CLEANERS • METAL STAMPINGS • DOVETAILS •
IGNITION AND TURN SIGNAL SWITCHES • ROLLED SHAPES



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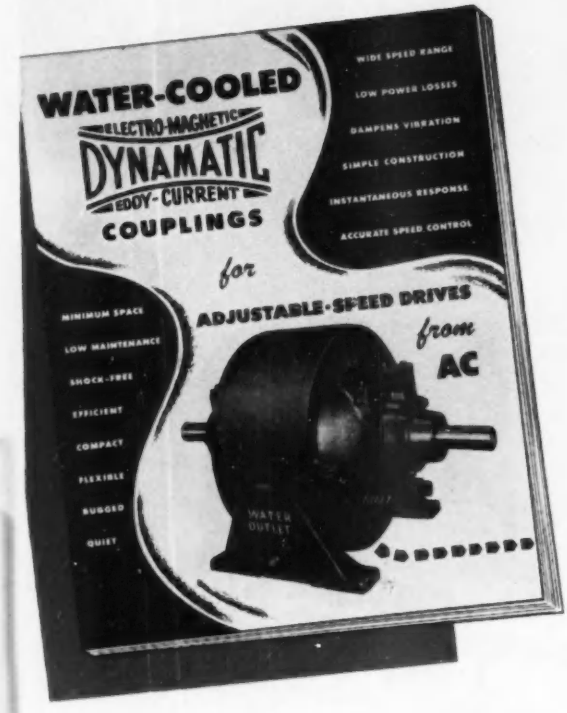

If you want the last word on Eddy-Current Couplings, write for your copy of this new booklet—just off the press

Eddy-Current Couplings provide a long list of desirable characteristics including instantaneous response, infinitely adjustable speed control, wide speed range, quiet operation, low power losses, low maintenance cost—without mechanical contact between the driving and driven members—and entirely from AC power.

If you are interested in this modern method of speed control, write on your company stationery for this comprehensive booklet. It presents a down-to-earth explanation of the Eddy-Current Principle, and the operation of the Dynamatic Eddy-Current Water-Cooled Coupling.

DYNAMATIC CORPORATION • **KENOSHA WISCONSIN**

Subsidiary of **EATON MANUFACTURING COMPANY,** **Cleveland, Ohio**

Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
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This quality feature is STANDARD construction on all-steel shank type

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DANLY INTEGRAL WELDED SHANK

A new welding technique that assures 100% fusion of shank to punch holder makes this superior construction possible. Knock out holes in the shank itself or machining on the punch holder face are much less likely to effect shank strength.

Features like this make Danly the nation's leading die set producer. Check these other Danly Die Set advantages and you'll see why die makers and production men everywhere prefer Danly Die Sets:

- *prompt delivery* . . . from the nearest of the nation wide system of Danly assembly branches.
- *precision construction* . . . leader pins and bushings hardened and ground to precision tolerances and lapped after assembly to provide a smooth running fit.
- *broad selection* . . . the wide range of Danly standard and stocked special die sets meets nearly every tooling need.
- *Danly reliability* . . . every Danly Die Set is backed by the experience accumulated in more than a quarter century of service to the stamping industry.

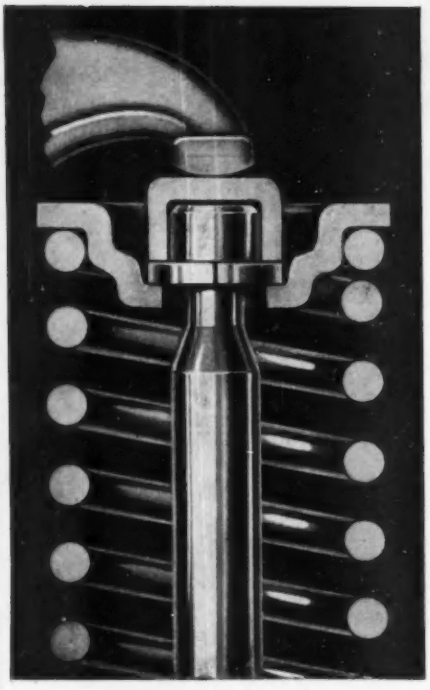
DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

PRECISION DIE SETS . . . STANDARD AND SPECIAL

WHICH DANLY BRANCH IS CLOSEST TO YOU?

DANLY®



EATON Free-Valves

Eliminate the Principal Causes of Valve Failure

—

Maintain Performance at New-Engine Level

—

Lengthen Valve Life

In general, valve failures are traceable to valve stem deposits and uneven seat deposits. When the valve is free, these conditions are largely eliminated. Stem deposits cannot build up; seat deposits are reduced and kept uniform. No one part of the valve head is subjected to excessive temperature for sufficient time to cause failure.

The Eaton Free-Valve is composed of a special spring seat washer, a valve stem cap, a pair of half-circle keys, and a special valve stem shape. During the lift cycle, valve motion is controlled, but not locked so as to prevent movement between the stem and guide. This freedom permits the valve to take variable positions in operation. It has a self-cleaning effect which, in millions of miles of service, has proven its ability to eliminate valve failures between major overhauls and to maintain fuel consumption and power output at approximately new-engine level.

Eaton Free-Valves can be designed into any motor vehicle engine.

EATON

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

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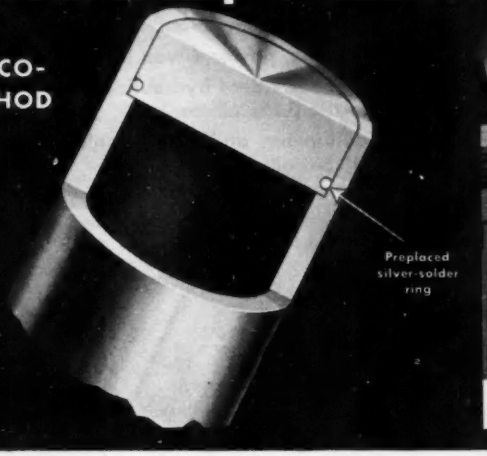
Production Doubled

Cost Cut 50%

Product Improved...

TOCCO-METHOD



OLD METHOD

TOCCO heating station with inductor and fixture for silver brazing cylinder and cylinder cap assemblies.

with TOCCO* Induction Heating

The experience of The Commercial Shearing and Stamping Company, who use TOCCO for silver-brazing hydraulic cylinder assemblies, is typical of the benefits obtained by America's leading metal-working plants who use TOCCO Induction Heating for brazing, hardening, heat-treating, forging and melting operations.

More Production with TOCCO

a. Heating time per piece cut from 15.3 minutes to 2 minutes on 5¼" I.D. cylinder.

b. Machining and cleaning operations, formerly required, are not needed after TOCCO brazing.

Lower Costs with TOCCO

a. Through a reduction in time required for each piece.

b. Through the elimination of scrap and reworks.

c. Because, since TOCCO is automatic, operator need not be trained or especially skilled.

Improved Product with TOCCO

a. Because of better looks and sales appeal.

b. Because distortion is minimized.

c. Because of elimination of field failures due to severe stress pockets.

TOCCO Engineers — can probably find applications in your plant, too, where TOCCO Induction Heating can increase output, cut unit costs and improve your product. Such a survey costs you nothing—and may save you a great deal.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW **FREE** BULLETIN

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Dept. H-8, Cleveland 1, Ohio

Please send copy of "A TOCCO Plant Survey—Your Profit Possibility for 1950".

Name_____

Position_____

Company_____

Address_____

City_____ Zone___ State_____

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Drills, Reams *Automatic* Transmission Cases

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- ★ 29 drilling, reaming, and spot-facing operations
- ★ Automatic lubrication
- ★ 5-station, power driven index table
- ★ J. I. C. standard hydraulic and electric installations
- ★ Toolometers and pre-set tools for controlling tool life and reducing down time

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

CASE 222

BEARINGS

A bearing manufacturer employed 200 in his inspection department. Fingerprints on highly polished surfaces had to be removed by buffing and polishing, until RUST VETO 266 (fingerprint neutralizer) was used to immerse parts immediately after inspection. Now this temporary preventive protects bearings in shipment as well as preventing fingerprint corrosion.

CASE 322

MACHINES FOR EXPORT

Machines shipped to the Argentine in open crates had been protected by Rust Veto. During the unloading they were dropped into the bay and stayed at the bottom for a year. When finally salvaged they were still free of rust, thanks to the protective coating.

VETO RUST WITH RUST VETO*!

[THESE MEN DID]

CASE 231

PISTON RINGS

Piston rings made for export were stored after the war in an unheated building for three years, coated with Rust Veto and wrapped in wax paper. When examined, parts were found to be in perfect condition, no trace of rust.

CASE 470

WHEELS

Cast steel wheels which are not painted before shipment are being protected by Rust Veto. Wheels roll through a trough containing an 8 to 1 emulsion, then into the freight car. The film dries rapidly. The same user employs the same Rust Veto in rinse tanks of washing machines, 5 quarts to 1,200 gal. of water.

CASE 428

DIESEL PARTS

A diesel builder uses Rust Veto 110-D for coating oil gaskets, cables and metal parts where the coating does not have to be removed. He ran a 6-months outdoor test against other corrosion preventives — Rust Veto won by protecting fully against rust spots or flaking.

* Reg. U.S. Pat. Off.

Bendix Products Division

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

TAKE ADVANTAGE OF THE TREND TO

HYDROVAC

THE WORLD'S FASTEST SELLING POWER BRAKE

Every day more and more commercial vehicle operators are turning to Hydrovac* as the final answer to their power braking problems. This unrivalled preference presents to manufacturers, whose vehicles are factory equipped with Hydrovac, a pre-sold market of vast proportions. Further, the millions of Hydrovac units in daily use furnish a potential service and replacement business that any alert dealer organization would welcome.

There is an added sales feature for the commercial vehicle manufacturer who standardizes on Hydrovac—the best proven and *most* popular power brake in the world.

*REG. U.S. PAT. OFF.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.
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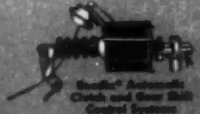
Centrimount Emergency and Parking Brake

S-B® Power Braking System for Cargo Trailers

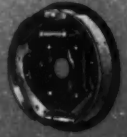
Bendix Hydraulic Power Steering

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES



Bendix® Automatic Clutch and Gear Shift Control Systems

Bendix Vacuum Power Gear Shifter



Bendix® Brakes for Buses, Trucks, and Passenger Cars

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

★ **New Remarkable Army Vehicle**

Just released are details of a military truck of advanced character built by Reo Motors for U. S. Army Ordnance. Some amazing specifications of this Reo M-34 Model are divulged, beginning page 32.

★ **What Is Russia's Industrial Strength?—Part One**

This exclusive and authoritative article on the pattern and potentials of the Russian industrial economy is published in two instalments. Part One deals with Soviet mineral resources, transportation, and manufacturing technology. Demitri B. Shimkin, Consulting Editor of AUTOMOTIVE INDUSTRIES and a specialist in Soviet affairs brings you information of top interest and importance. Page 34.

★ **Metal Adhesives for Aircraft Assemblies**

Convair's two outstanding metal adhesives when used in combination in separate layers produce a bond of consistently adequate shear strength and flexibility. Tradenamed Metlbond, some 5500 sq ft of the B-36 Bomber's skin assemblies are attached by this method. Page 38.

★ **Scheduling Parts Production By Electronic Brain**

Newest version of the IBM electronic computer installed at Buick is capable of punching 6000 cards an hr, or an output equivalent to 36 of Buick's older mechanical computers. Its lightning—and lightening—handling of two types of intricate problems in motor car plants is most interestingly discussed. Page 46.

★ **Studebaker's Automatic Transmission—Part One**

Special equipment for building Studebaker's transmission is described in this first part of two on the subject. Specific operations on the case and its extension, together with assembly and test procedures are elaborated upon. Page 48.

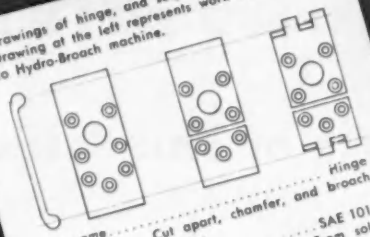
★ **15 New Product Items And Other High Spots, Such As**

Fast, accurate boring operations on Cadillac cylinder heads; the many new machines at IHC truck plant; a 10 speed transmission having a single control lever; the British Ford launching of a $34 million program; a British race car with unique chain drive; and how all fluid in a new brake system is kept under constant pressure.

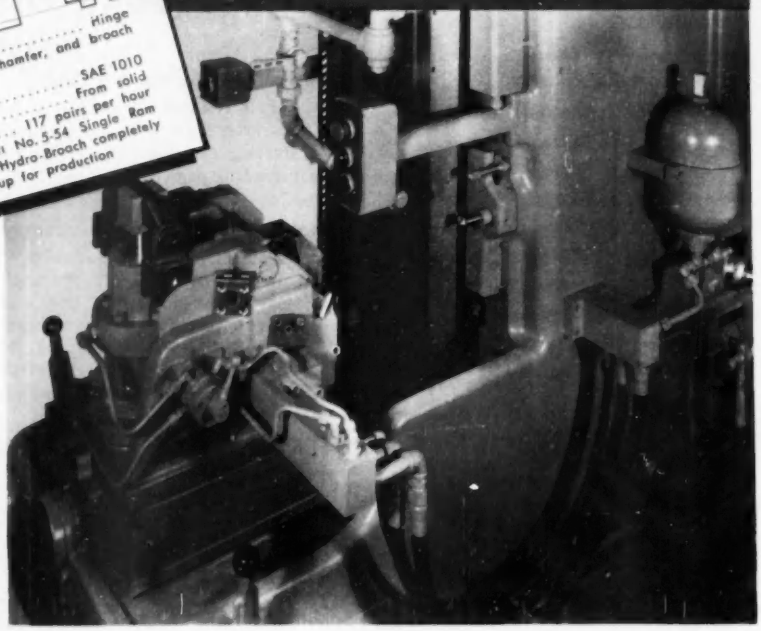
News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

A pair of hinges
CUT APART AND BROACHED EACH STROKE OF THE RAM

Drawings of hinge, and sequence of operations. Drawing at the left represents work as delivered to Hydro-Broach machine.



Part name ..... Hinge
Operation ..... Cut apart, chamfer, and broach notches
Material ..... SAE 1010
Stock removal ..... From solid
Production ..... 117 pairs per hour
Machine ..... CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach completely tooled up for production



CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach Machine. Seven sizes are available up to 10-ton broaching force, 66" stroke. Write for catalog No. M-1389-2.

Progressive machining has its advantages. In this case, there are three: 1) standard machine; 2) one setup; 3) low cost. The machine is a CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach, tooled up by Cincinnati Application Engineers with a manually controlled hydraulically actuated fixture, to cut apart and broach hinges. In the left-hand station, the parts are cut apart and chamfered. Then they are transferred to stations 2 and 3, where the notches are broached in the pin end. By having three stations in a single fixture, and three rows of broach inserts (cutters) on the ram, one complete pair of hinges is produced each cycle. The operator is protected by Preset Cycle Control, a standard Hydro-Broach feature. The ram does not descend through its cutting stroke until the operator presses the Preset buttons with two hands. ¶This example is typical of Cincinnati Application Engineering in low-cost production. It's to your advantage to consider Hydro-Broach machines and Cincinnati engineers first when replacing equipment or re-tooling for a new product. May we hear from you?

REPLACE WITH A NEW CINCINNATI

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

CINCINNATI

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MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 3 August 1, 1950

Packard to Spend Million on Plant Improvement

Packard expects to spend more than a million dollars on plant improvements before the end of this year. The program will include the building of four test cells and a sub-zero laboratory at the proving grounds, installation of new power house equipment and revamping of certain sections of the factory to provide better manufacturing facilities.

Oldsmobile Six Not Likely in 1951 Models

The announcement by Oldsmobile that it was abandoning its six-cylinder model 76 has led to considerable speculation that the division would announce a new six-cylinder engine, possibly a V-6 for its 1951 models. It seems highly unlikely, however, that such would be the case since the engine plant producing six's is in the process of being tooled for additional production of the Rocket Eight engine and there is simply no manufacturing space available to produce a six. Whether or not Oldsmobile will eventually return to a six in its line has not yet been decided by the management, which says that economic conditions will undoubtedly play an important role in such a decision.

GMC Reports Bus Sales Improving

GM's GMC Truck & Coach Div. reports that the bus business is showing gradual improvement. During June deliveries totaled 214 units, the second consecutive month to exceed the 200 mark.

Crisis Effect on Automobile Industry Still Not Clear

What direction a definite military program would take in the automobile industry in the event of all-out war is still not too clear. The military services have been working with the automotive and other industries diligently since the end of the last war in mapping out a course of action that would put into effect on short notice a program in which each company would know exactly what it was expected to produce. It is reported that all automotive companies have "phantom" orders on hand, but it should not be assumed that changeover would be effected overnight. It would take many weeks of intensive work to convert the industry again to full time military production. Actually, it now appears that before that happens standby facilities held by the government would be activated, and there is some evidence that that is being done.

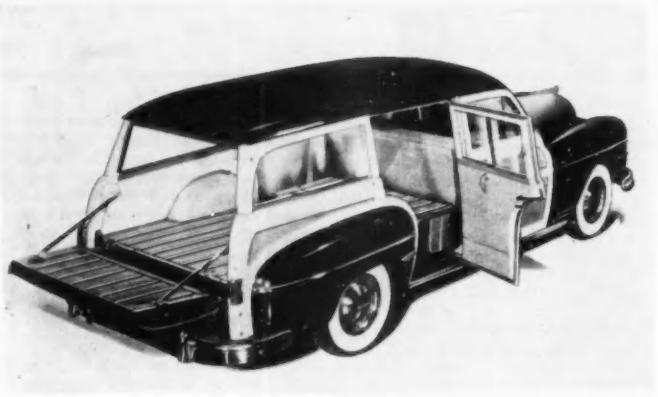
It does seem quite certain, however, that whatever the outcome of the present struggle, military production will be stepped up, and more money and materials will be diverted to military preparedness both here and abroad. The outlook is not a happy one in any event. It is just one more in a long series of disturbing influences that have kept the industry in a state of uncertainty for the past decade. There has not been anything resembling a normal situation since 1940. Since that time there has been war and an uneasy peace harassed by strikes and shortages that have perpetuated the constant state of imbalance between supply and demand. Now just when the industry thought it could see a correction of that situation within the next few months, war has broken out and again upset all planning.

ECA Aid to Help Boost French Farm Implement Output

Providing for $4.6 million in ECA financing for the purchase of machine tools, tooling equipment and tractor parts for a French affiliate of the International Harvester Co., Compagnie Internationale des Machines Agricoles (CIMA), a project to increase French production of tractors and other farm implements has been approved by the Economic Cooperation Administration. The total cost of the project is estimated at the equivalent of $13 million, and of the ECA funds, $2,234,000 will be used for the purchase of United States machine tools and tooling equipment, and $2,366,000 will be used to pay

TWO IN PRODUCTION

GM's GMC Truck & Coach Div. is now producing in volume its two new Diesel tractors, series 640 and 650 (latter shown above), described on page 46, Jan. 1st, AUTOMOTIVE INDUSTRIES. The 640 series model is designed to handle gross combination weights of 45,000 pounds, and the 650 series will meet the needs of those hauling loads in the 55,000 lb GCW range.



FOLDS DOWN

With a new fold-down rear seat, this new six-passenger De Soto station wagon can provide a flat luggage-carrying space extending for 7½ ft from the front seat to the tailgate. The overall length of the station wagon is 17 ft. 11 in., and the car is equipped with a 112 hp engine.

for component parts of tractors which will be assembled in France. In addition to the ECA funds, the project will be financed with non-ECA dollars amounting to $2.8 million, of which $1 million will be a loan from International Harvester. Costs to be paid in French francs are estimated at the equivalent of $5.6 million. As a result of the project, the annual production of tractors is expected to be increased by 7500 units. Output of other farm implements will be expanded by 30,000 tons annually.

Fiat Building First Italian Jet

The Fiat Aeritalia factory is now busy working on the first Italian jet airplane. Called the Fiat G. 80, and designed by Giuseppe Gabrielli, it will be used for training pilots and as a fighting plane. Powered by a Goblin IV jet engine, it will have a range of over 1100 mi, and its normal speed will be 375 mph.

Cadillac Demonstrates Fuel Economy

Cadillac recently staged a demonstration fuel economy run for members of the press in Detroit with rather startling results. Two production models were used, both four-door sedans—a series 61 and a series 62. Each car was equipped with a standard one-gallon container connected directly to the carburetor and a weighed gallon of fuel was used on each of the two legs of the trip. With three passengers, plus the driver, the car started through city traffic from the Cadillac plant to the Willow Run Expressway driving at normal city speeds at about 50 mph on the highway. On the outward trip, bucking a 12-mph wind, the 61 ran 18.9 miles and the 62, 18.7 miles, on the measured gallon. On the return trip at 50 mph, all highway driving, the 61 made 21.1 miles and the 62 ran 21.8 mpg. Average for the two legs was 20 miles for the 61 and 20.25 for the 62. Both cars were equipped with Hydra-Matic transmission.

Nash Defers Decision on $1000 Automobile

The critical steel shortage has deferred Nash's decision on whether or not it will go ahead with its experimental $1000 NXI small car, which has been shown around the country since early this year. The company has completed its production pilot model incorporating some modifications suggested by the public through a cross section survey covering nearly a quarter million motorists. The change will include a slight increase in tread and wheelbase and a single front seat for three passengers instead of the original single two seats.

HOT SEAL

At GM's Guide Lamp Div. these reflectors, bulbs, and gaskets have just descended from a long overhead oven where the outer surfaces of the specially compounded rubber gasket have reverted from the vulcanized to the sticky state. After the lens is installed, the unit goes through the oven shown and is placed, still hot, in a press where the reflector flange is clinched. This combination of sticky gasket and tight clinch is said to insure an airtight seal that preserves the reflector for the entire life of the unit.

INDUSTRIES

Studebaker to Use Reo Engines in Army Truck

Further clarification on the military truck order granted to Studebaker for 4000 units reveals that the vehicles are identical in every respect to those being built by Reo. The latter company will furnish engines, cabs, and other sheet metal to Studebaker and the driving components will be furnished by Timken, which also makes the same unit for Reo. Other truck companies to be given military truck orders are Dodge, ¾-ton units; International, 1½-ton units; Chevrolet, ½-ton trucks; GMC, 2½-3-ton models; and Willys-Overland, ¼-ton Jeeps. It is emphasized, however, that these military orders are largely for replacement of aged vehicles now in military service.

Steel Only Limitation on Vehicle Production

Although no one in the automobile industry knows how long it can last, all companies are piling on steam in an all out production drive. Output is limited by availability of steel and already there have been indications that the ambitious schedules set for August may not be met. Ford was forced to reduce production of Mercurys at the Metuchen and St. Louis plants to four days a week because of a steel and parts shortage, reducing production about 900 units a week. However, the plants hope to go back on full schedules this month. Reports from other manufacturers state they are running very close to the ragged edges with inventories of certain items down to a few days' supply. One division of GM recently received a supply of fender stock only three hours before steel on hand would have been exhausted.

Government rationing of materials is not expected soon since the industry itself is expected to allocate materials equitably on a voluntary basis. If that fails, however, government action is considered likely, insofar as allotting steel to companies with military orders and possibly also to insure supplies for smaller producers of civilian items. Demand from competitive industries is also at a high peak, with much of it undoubtedly caused by inventory buying as a hedge against future shortage if steel is converted to military use.

Meanwhile, most companies in the industry continue to report record sales figures and with reports now in for the first half of the year, new peacetime records are being hung up by most companies. Buick, Ford of Canada, Chevrolet, Oldsmobile, Mercury, Nash, Cadillac, and Studebaker have all reported all-time highs for the first half. Ford set a new six months' record for truck sales and passenger car sales were the highest in 20 years. Kaiser-Frazer reports that demand for the Kaiser line is far outstripping its capacity to produce with only the shortage of steel keeping the company from hanging up a new production record.

LOWERS INTO THE GATE

This new Chrysler Royal Station Wagon, which has a wide-view rear window that lowers completely into the tailgate, is one of eight all-purpose vehicles recently announced by Chrysler Corp.'s Plymouth, Dodge, De Soto, and Chrysler divisions.

Republic Aviation Buys Plant from Government

The Republic Aviation Corp. has purchased all of the buildings and the 500 acres of airport and plant area now occupied by the corporation from the General Service Administration, a U. S. Government agency for $5,332,000.

Hayes Steel Expands to Make Automotive Axles

Hayes Steel Products, Toronto, Canada, will expand operations, directors state, by undertaking the manufacture of a special type of axle for automotive vehicles. Dana Corp. has agreed to make available the necessary technical assistance and data. The proposed project will involve estimated expenditures of $1.5 million.

Chevrolet Truck Adds Long Wheelbase Unit

Chevrolet this month goes into production of a long wheelbase model representing an addition to the line. The unit is a conventional cab and chassis with 179-in. wheelbase and powered by the 105-hp truck engine. Measurement from cab to rear axle is 102 in. The frame with seven cross members extends 81 in. behind the rear axle to provide support for bodies up to 16 ft long. The longest wheelbase in Chevrolet up to this time has been 161 in.

Armed Services Announce More Military Contracts

Orders for automotive spare parts dominate recently announced Army contracts: Canvas Fabricators, Inc., Chicago, Ill., $1,231,407; Trico Products Corp., Buffalo, N. Y., $177,517; Tru-Flex Rubber Products Co., Los Angeles, Calif., $113,595; Willys-Overland Motors Inc., Toledo, O., $883,338; Ainsworth Mfg. Corp., Detroit, Mich., $201,146; The Mohawk Rubber Co., Akron, O., $196,635; Cooper Tire & Rubber Co., Findlay, O., $265,401; Ueber Tool & Mfg. Co., East Detroit, Mich., $100,310; Federal Motor Truck Co., Detroit, Mich., $1,017,725; Firestone Industrial Products Co., Akron, O., $1,490,215; The Goodyear Tire & Rubber Co., Inc., Akron, O., $1,377,530; Bolt & Nut Div., Republic Steel Corp. Cleveland, O., $309,272; The Lamson & Sessions Co., Cleveland, O., $258,355; Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., $312,297; United Auto Parts Co., Inc., Kansas City, Mo., $158,415; Biederman Motors Corp., Cincinnati, O., $587,526; Milwaukee Gear Co., Milwaukee, Wis., $116,635; Versatile Engineering & Mfg. Co., Dearborn, Mich., $159,060; Chrysler Corp., Detroit, Mich., $1,133,113; Revere Copper & Brass Inc., Detroit, Mich., $140,835; International Harvester Co., Detroit, Mich., $620,318; United Motors Service Div., GMC, Detroit, Mich., $579,813; Reading Batteries, Inc., Reading, Pa., $1,093,287; Diamond T Motor Car Co., Chicago, Ill., $274,006; American Finishing Co., Memphis, Tenn., $153,670;

1950 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Five Months' Totals.

	March	April	May	Five Months 1950	Five Months 1949	% Change
Chevrolet	33,854	34,553	34,607	150,406	141,951	+ 5.96
Ford	27,987	27,231	26,945	119,667	69,129	+ 73.11
International	8,909	8,512	8,290	38,104	38,116	− 0.03
G.M.C.	8,147	7,772	7,934	34,687	31,708	+ 9.39
Dodge	7,418	4,861	3,773	31,893	47,784	− 33.88
Studebaker	4,530	3,872	3,843	19,244	23,279	− 17.33
Willys-Truck	948	923	1,235	4,719	10,023	− 52.92
White	995	980	931	4,109	3,548	+ 15.88
Mack	880	804	726	3,918	2,557	+ 53.23
Willys-Jeep	678	727	670	3,235	7,510	− 56.93
Diamond T	492	496	427	2,195	2,548	− 14.85
Divco	294	343	349	1,497	1,566	− 4.41
Reo	275	269	234	1,258	1,918	− 34.41
Autocar	147	285	134	807	838	− 3.70
Brockway	187	188	140	807	678	+ 19.03
Pontiac	183	172	129	768	164	+368.29
Federal	89	102	124	499	653	− 23.58
Crosley	49	37	42	200	504	− 60.32
Kenworth	46	46	58	200	168	+ 19.05
Sterling	33	27	39	142	89	+ 59.55
F.W.D.	25	20	21	130	179	− 27.36
All Others	143	137	134	731	1,449	
Total	96,266	92,241	90,786	418,916	386,357	+ 8.43

* Data from R. L. Polk & Co.

and The Electric Auto-Lite Co., Toledo, O., $115,952.

Other Army contracts included Chevrolet Motor Div., General Motors Corp., Detroit, Mich., personnel carriers, five pass., 4x2, light, $188,323; Dorsey Trailers, Inc., Elba, Ala., six-ton, semi-trailer, 2W, van, $436,168; Watson Automotive Equipment Co., Washington, D. C., ambulance, ¾-ton, 4x2, metropolitan, $188,710; Fargo Motor Corp., Detroit, Mich., trucks, one-ton, 4x4 pickup, w/winch, $125,477; White Motor Co., Cleveland, O., trucks, five-ton, 4x2, tractor, $205,534; and Truck & Coach Div., GMC, Pontiac, Mich., truck, 2½-ton, 4x2, tractor & dump, $1,165,473.

The Navy has announced the award of the following contracts: United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn., engines, $22,984,337; United Aircraft Corp., propeller assemblies, $249,735; United Aircraft Corp. (Sikorsky Aircraft Div.), flotation gear—installation testing, etc., $50,772; Bendix Aviation Corp. (Bendix Radio Div.), Towson, Md., direction finder equipment, $50,000, and field change kits, $500,000; Chrysler Corp., Detroit, Mich., Dodge truck spare parts, $143,118; and Packard Motor Car Co., Detroit, Mich., diesel engine clutch and reduction gear, $450,000.

Jack & Heintz Precision Industries, Inc., has received two Air Force contracts totaling $1,650,000. One contract for generators totals $1,050,000 and the other, for inverters, is in the amount of $600,000. The company had previously received other sizable orders from the Air Force.

MORE ROOM IN BACK

With the new front end treatment and exterior trim of the 1950 line, the new 1950 six-passenger Dodge Coronet station wagon has two seats, and the rear seat folds down to form a level, chrome-stripped floor more than 9½ ft long from the back of the front seat to the end of the tail gate. With the tail gate up, there's more than seven feet of cargo space.

Famous Wrong Guesses— GM On Chevrolet

Ordinary mortals who have had a bad day at the track or who have taken a shellacking in the stock market may get some comfort in a bit of ancient history recited recently by T. H. Keating, general manager of Chevrolet and GM vice-president. He says that shortly after the first world war, GM's administration made a financial survey of Chevrolet and recommended to the board of directors that the division be abandoned and that efforts be concentrated on other lines. Fortunately, the advice was not taken. The occasion of Mr. Keating's remark was the production of the 24 millionth Chevrolet. The car was produced at the Norwood plant, one of 11 which Chevrolet is currently operating. The last millionth car was produced in a six months' period, which the company says is an all-time industry record.

Korean War Starts Rumors

So far the Korean war has had very little direct effect upon the automobile and truck industry. As is usual at such times there has been the expected flurry of wild rumors about automobile plants converting to production of war goods. There was in late June a flurry of orders for military vehicles, but the simple facts are that these would have come regardless of what the international situation might be. These orders had been in the works for months. Government procurement officials had for one reason or another delayed letting the contracts. However, it was only coincidence that the outbreak of the Korean trouble practically coincided with the closing days of the government's fiscal year, and the military pro-

curement services completed their contracts at that time in order to get in under the appropriations for the last fiscal year. Otherwise, the money would have been returned to the treasury. The vehicles ordered are largely to replace worn out vehicles and those shipped abroad to other countries under military preparedness programs.

How civilian production will ultimately be affected is still unknown. Probably the first effect will be the pinch on steel supplies and possibly other critical materials that will be required if military production is stepped up. However, it would take months to implement any sizable program that would bite heavily into supplies and materials required by the automobile industry and barring an all-out sudden war mobilization in this country it appears that production of cars and trucks will continue at a high rate, although possibly not quite as high as had been expected a few weeks ago. Steel has been and is getting increasingly tight and it will not be at all surprising if some of the projected high schedules set for August will not be reached. Consequently, any military diversion will be felt at once. Nonetheless, it looks as though output of motor vehicles will remain steadily high at least during the next several weeks.

There has, of course, been some panic buying of automobiles, and to some extent trucks, since the Korean war started. This surge of fear buying piled on top of an already heavy demand has created a definite shortage of automobiles and has aggravated the imbalance between supply and demand that existed all this year. Several companies have reported that their backlogs are now larger than they were a couple of months ago.

What effect the present tense situation will have on new model announcements is still problematical. Some companies already are well along with plans and undoubtedly will go ahead with them, but others who had planned a change late this year may continue all-out production of current models if at that time there appears to be a possibility that the situation may be much worse and lead to an curtailment or suspension of passenger car production.

SAE Meeting in Los Angeles in August

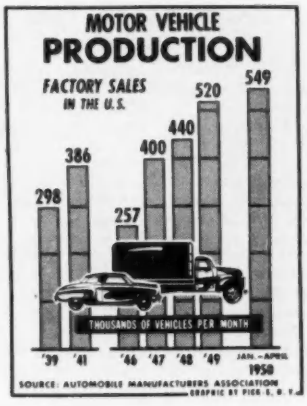
A technical review of the continuing improvement in the design, development, and operation of land vehicles and aircraft, and of their powerplants, will highlight the National West Coast Meeting of the Society of Automotive Engineers scheduled for Aug. 14-16 at Los Angeles, Calif. Recently an eight-year goal of aircraft engine stud interchangeability was realized by the approval of 92 Air Force-Navy-Industry stud standards (68 stepped studs and 24 straight studs) developed by the SAE. These new stud standards will permit for the first time, all aircraft engine manufacturers to use common parts numbers and to blend purchasing requirements, enabling the military services to stock one stud type for every 15 or 16 previously required.

Buick Names J. L. Powers General Superintendent

Jesse L. Powers has been promoted to general superintendent on special assignments at the Buick Motor Div. of GM. He formerly was superintendent of the Buick engine plant and will be succeeded in that post by Stanley White formerly general assistant superintendent. Buick has also announced the appointment of Jerry B. Doll as superintendent of the service parts manufacturing plant. He had previously been assistant general superintendent at the engine plant.

New Air-Cooled Diesel Engine Reported

We have just heard about a new air-cooled Diesel engine being developed in Texas, and said to be ready for announcement soon. However, no details are available at this time.



Fruehauf Pays Off All Bank Loans

The Fruehauf Trailer Co. has paid off in full all of its notes payable to banks on lines of credit, marking the first time in many years that no bank obligations are outstanding. Sales have increased steadily month by month during the first half of this year, totaling more than $50 million for the six-months' period, nearly $13 million ahead of the same period last year. The company has also sold the building occupied by its branches at Omaha, Neb., and Kansas City, Mo., to investors and is retaining occupancy under long term leases.

1950 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Five Months' Totals.

	March	April	May	Five Months 1950	Five Months 1949	% Change 1950 over 1949
Chevrolet	121,764	121,188	117,626	544,735	324,015	+68.12
Ford	108,157	103,499	105,196	466,309	305,497	+53.29
Buick	48,768	47,487	46,958	204,352	145,348	+40.59
Pontiac	38,788	36,918	37,429	170,935	108,947	+56.90
Oldsmobile	34,797	32,116	31,520	144,620	96,281	+50.21
Mercury	29,898	28,645	31,030	126,541	66,852	+89.28
Studebaker	29,942	29,267	25,987	120,466	69,947	+72.22
Plymouth	12,921	4,919	13,891	104,144	184,643	−43.60
Nash	14,549	18,085	20,380	69,811	51,948	+34.39
Dodge	10,633	4,337	7,818	64,234	83,251	−22.84
Hudson	12,609	13,754	14,147	58,611	62,083	− 5.60
Chrysler	5,022	2,295	4,113	32,488	47,252	−31.25
Packard	6,776	7,726	7,614	30,802	38,386	−19.76
Cadillac	7,631	7,724	7,773	29,706	33,212	−10.55
De Soto	3,637	1,625	2,794	23,112	37,927	−31.06
Kaiser	3,521	2,914	3,704	15,102	23,356	−35.34
Lincoln	2,889	3,001	3,027	13,169	17,425	−24.43
Willys	2,407	2,279	3,103	11,417	10,933	+ 4.43
Frazer	474	1,850	2,603	5,734	9,737	−41.11
Crosley	818	495	503	2,062	5,281	−49.03
British Austin	560	499	438	2,448	1,226	+99.67
British Ford	96	101	85	425	3,002	−86.75
All Others	430	489	622	2,160	2,596	.....
Total	495,885	471,215	480,363	2,248,015	1,729,145	+29.99

* Data from R. L. Polk & Co.

News of the AUTOMOTIVE

John Gordon Made Head of GM Engineering

John F. Gordon, formerly general manager of Cadillac, has been appointed vice president of GM in charge of the engineering staff. He succeeds James M. Crawford, who has been ill for several months and is currently on disability leave of absence. When Mr. Crawford returns he will continue to serve as a member of the engineering policy group. Don E. Ahrens, who had been general sales manager of Cadillac since 1935, has been named the new general manager of that division and has been elected a vice president of GM and a member of the administration committee. Mr. Ahrens will be succeeded as Cadillac general sales manager by James M. Roche, formerly director of personnel and public relations.

Crosley Names New Sales Vice President

Crosley Motors, Inc., has appointed J. L. Armstrong vice president in charge of sales. He was formerly field sales manager for Bendix Home Appliances, Inc.

British Develop Secret Car Called the Crab

Described as top secret, a new automobile called the Crab, developed by Henry Ferguson Research, Ltd., of England, is said to be capable of running forwards, backwards, or sideways at the same speed.

Tire Makers Boost Price on Original Equipment

The prices of materials and components for new passenger cars and trucks continue to climb. The latest increase is a boost of from 6 to 12½ per cent on original equipment tires. The price increase announcement by Firestone Tire & Rubber Co. ranges from 6 per cent on farm and tractor tires to 8 per cent on passenger car tires and 12½ per cent on bus and truck casings. The company said that greatly increased prices for rubber and other materials, plus higher manufacturing costs made the boost necessary. Other manufacturers are expected to follow the Firestone increase, the first in more than a year to vehicle manufacturers.

Sparks-Withington Div. Spurs Safety Laws

Sparton Automotive Div. of Sparks-Withington Co. is spearheading a movement toward uniform safety regulations in all states. The company points out that some states are far ahead of others in requiring safety equipment such as turn signals, head, tail and stop lamps, reflectors, signal lights and so forth to meet definite specifications and to be approved by testing laboratories. They point out that Michigan, for example, with one of the weakest safety codes in the nation had the highest accident rate in the country over the Memorial Day and Fourth of July holidays, whereas states like New Hampshire, New York, New Jersey and Pennsylvania with strict safety laws had extremely low fatality records during the same period. The program is still in the formative stage, and the company hopes to arouse public opinion behind legislation for greater strengthening and making uniform traffic regulations in all states.

New Synthetic Rubber Ready for Tire Test

Tire manufacturers are interested in a new type of synthetic rubber developed by Phillips Petroleum Co. in cooperation with the Office of Rubber Reserve. The new rubber went into production in July on a very small scale to supply material for test tires. Laboratory reports indicate that the new rubber called "PB" is superior to the old GRS, and may possibly be equal to cold rubber in quality. However, tire manufacturers want to make extensive road tests before passing any decision. The new rubber requires no styrene, a coal tar product which has been in short supply because of the coal strike and heavy demand from other users.

Hudson Appoints Levis Used Car Manager

The Hudson Motor Car Co. has announced the appointment of Herbert C. Levis as used car manager. For the past 12 years he has been associated with Chevrolet in various executive capacities in the parts, truck, organization, distribution, and used car departments.

Reo Buys Assets, Tools of Tricycle Builder

Reo Motors, Inc., has purchased the machinery, fixtures and design rights of Velo King, Inc., velocipede manufac-

REGIONAL SALES OF NEW PASSENGER CARS

New passenger car sales continue strong in the South Atlantic, East South Central, Mountain and Pacific states, but show a tendency to level off in the Middle Atlantic and East North Central states when sales for May are compared with April of this year and with May of 1949. During May new car sales in New England and the West South Central states fell below April and in the case of the West South Central states considerably below May of 1949 which is contrary to the trend in all other states.

Zone	Region	May 1950	April 1950	May 1949	Five Months 1950	Five Months 1949	Per Cent Change: May over April	Per Cent Change: May over May, 1949	Per Cent Change: Five Months 1950 over 1949
1	New England	27,183	26,151	26,863	123,399	103,886	− 3.51	+ 1.12	+18.78
2	Middle Atlantic	91,337	90,077	88,300	420,498	333,661	+ 1.40	+ 3.04	+26.03
3	South Atlantic	61,777	54,625	53,070	270,353	199,461	+13.09	+16.41	+35.54
4	East North Central	120,120	118,635	109,054	552,918	443,896	+ 1.25	+10.15	+24.56
5	East South Central	26,043	22,254	20,064	120,148	89,181	+17.03	+29.67	+34.72
6	West North Central	52,847	53,211	42,952	231,725	170,601	− 0.68	+23.04	+35.83
7	West South Central	36,847	39,619	42,151	205,913	142,712	− 7.00	−12.58	+44.29
8	Mountain	18,701	17,030	14,567	76,071	59,028	+ 9.81	+28.20	+28.87
9	Pacific	53,529	47,613	51,203	244,990	186,719	+12.42	+ 4.54	+31.21
	Total United States	488,363	471,215	448,264	2,246,315	1,729,145	+ 3.64	+ 9.43	+29.89

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

turer, of Canandaigua, N. Y. The equipment will be moved to the Reo-Lansing plant where Reo plans to manufacture tricycles and possibly other children's toys. The move is part of Reo's plan to diversify its products and take advantage of excess plant and equipment for stabilizing employment and sales. The company currently has under development a child's automobile powered by the air-cooled engine which is currently being manufactured for the power mower.

Acme White Lead & Color Changes Firm Name

Acme White Lead & Color Works has changed its name to Acme Quality Paints, Inc. The change in name was made to bring the firm name into conformity with the company's trade mark of "Acme quality paints."

Dr. Stockdale to Talk at ASBE Convention

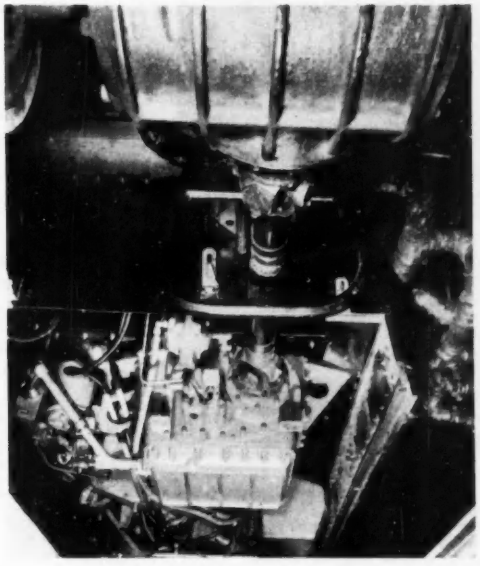
The American Society of Body Engineers has announced that Dr. Allen A. Stockdale of the NAM will address the openhouse session at the Society's Fifth Annual Technical Convention in Detroit Nov. 1-3. Other speakers already selected for the meeting are F. W. Edwards, sales manager of Eaton Manufacturing Co.; J. W. Duhn of Chrysler Engineering Laboratories, and W. C. Hess, vice president of Hess & Eisenhardt Co.

CUSTOM IN AND OUT

The Mercury Monterey, shown above, introduced into the 1950 Mercury line, is one of three new coupes recently announced by Ford's Lincoln-Mercury Div. with vinyl-leather covering a steel top, and custom interior and exterior trim treatment. The Lincoln Lido and Lincoln Cosmopolitan Capri are the other two models.

GM Stock Split Vote Set for Sept. 27

Stockholders of GM will vote at a special meeting Sept. 27 on a proposal that the corporation's authorized share of common stock be doubled from 75 million shares of $10 par value to 150 million shares of $5 par value and to provide for issuing two shares of the new stock for each share of the current outstanding $10 par value stock. If approved, the stock exchange would begin about Oct. 3.



POWER BY TWO

Power for the Budd Co.'s rail Diesel car, the RDC, is provided by two 6-110 General Motors 275-hp two-stroke Diesel engines. Each engine, transmitting its power through a GM Allison hydraulic torque converter, drives one axle. Only one driving axle is used on each of the two trucks. The engine - converter combination is mounted underfloor, as shown, and comparatively close to the axle it drives.

Studebaker Names Manager of New Eastern Plant

Studebaker has announced the appointment of Arthur D. Whitmer as manager of its news passenger car assembly plant to be built at North Brunswick, N. J. He is succeeded in his former post of superintendent of the Studebaker truck plant by Lloyd E. Ransom, general foreman since 1948.

Continental Making Changes in 427-cu in. Engine

Continental will soon announce mechanical changes in its model T-6427 427-cu in. truck engine currently being used by Reo, Federal, Diamond T and others in certain models. Installation of valve rotators, different type valve lifters, and changes of the cam contour is expected to give an increase of about 20 per cent in horsepower.

Rolls-Royce Makes Special Chassis for Princess Elizabeth

A special chassis, the first and possibly the only one in the series, has

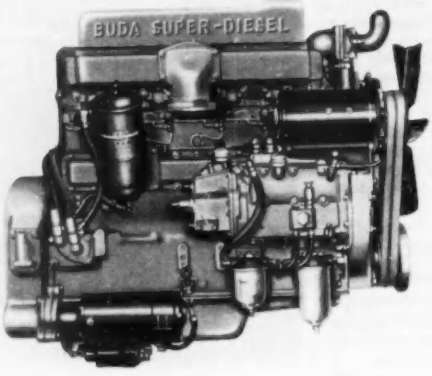
been built by the Rolls Royce company to the order of Princess Elizabeth and the Duke of Edinburgh. With a wheelbase of 145 in. the overall length with the Mulliners sedan body is 228 in. Chassis weight is 3300 lb.

Gill is New President of SBAC

The new president of the Society of British Aircraft Constructors is W. T. Gill, commercial and financial director of Rolls Royce, Ltd. In addition, he is a director of Renfrew Foundries, Bentley Motors, Rotol and Park Ward companies.

GM Plans Expansion at Moraine Products

GM is planning a $1 million expansion program at the Moraine Products Div. automotive parts plant near Dayton, O. The program includes construction of an additoinal 110,000 sq ft of floor space.



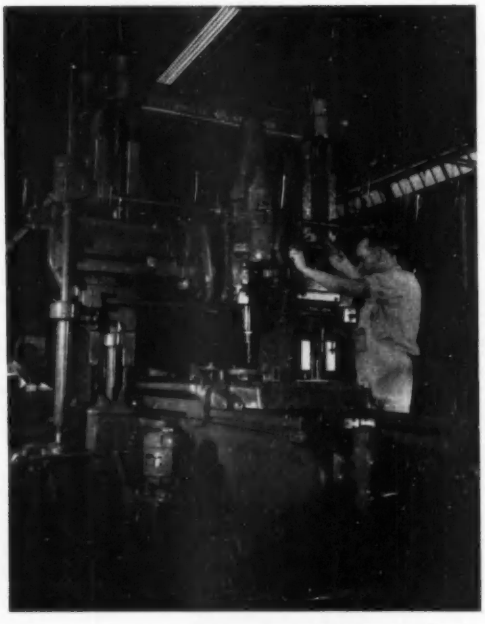
BRAND NEW BUDA

For operation in all types of trucks, buses, and tractors, carrying gross loads up to 52,000 lb, the Buda Co.'s new model 6-DTS-468 is a six-cyl supercharged Diesel engine developing 152 hp and a maximum torque of 370 lb-ft. at 1600 rpm. The engine has a bore of 4¼ in., a stroke of 5½ in., and a piston displacement of 468.3 cu in.

Name Perrot Head of French SAE

Henri Perrot, front wheel brake pioneer, has been elected president of the French Society of Automotive Engineers (S.I.A.). Last year he became associated with the Lockheed Brake company.

HIGHLY ACCURATE



Toolmakers in the Ford Motor Co.'s Engineering Laboratory toolroom and machine shop in Dearborn have recently installed a new Swiss SIP jig-boring machine claimed to be capable of producing work accurate to within 0.00001 in. Known as the Hydroptic-B model, it features an optical measuring system with built-in standard scales and micrometer microscopes. The microscopic graduations are disposed in a sealed space enclosed by the internal faces of the scales and surfaces on which they slide. They are observed in the measuring microscopes built into the bed and the cross-rail of the machine. The scale length of 45 in. is divided into 0.1 in. per line, and the final adjustment scale goes down to 0.0001 in. By crossing the dash line and the hair line in the lens, the machine is said to give an accuracy of 0.00001 in. Emil Zoerlein, supervisor of the Ford Experimental Machine Shop, Inspection and Engine Fabricating Section, where the machine has been installed, said that a dust-proof room 16 ft by 19 ft with 13 ft high ceilings is being constructed around the jig-boring machine. Fresh, clean air is to be taken in through the ceiling and exhausted through the louvres in the bottom of the walls. Later, air-conditioning will be added to maintain constant temperatures.

Automobile Industry Largest Cotton User

The automobile industry is the largest single user of cotton by a wide margin, according to the cotton industry. Its 1947 report showed that automotive manufacturers used more than a million bales of cotton, or nearly twice the 557,680 bales used by the second place user, the shirt industry.

Budd Selling New Truck Wheel

A new lightweight, high-strength steel disk wheel has been developed by the Budd Co., and is being offered for sale on trucks and trailers, or for field conversion by all Budd wheel distributors throughout the nation.

Australian Company to Make B-W Universal Joints

Universal joints, as built in the United States by the Mechanics Universal Joint Div. of Borg-Warner Corp., will soon be made in Australia by Repco, Ltd., of Melbourne. The move was described as "another step toward making the Australian automotive industry self-dependent" in a joint announcement by D. E. Callinan, director, Repco, and J. W. DeLind, Jr., president, Borg-Warner International Corp. The universal joints will be made under license to Borg-Warner International.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

General Motors Corp., Cadillac Motor Car Div.—**James M. Roche** has been appointed General Sales Manager. The appointment of **John F. Gordon**, Vice-President of GM and General Manager of Cadillac, as Vice-President of GM in charge of the Engineering Staff, has also been announced. Mr. Gordon succeeds **James M. Crawford**, who is on a disability leave of absence. **Don E. Ahrens**, General Sales Manager of the Cadillac Motor Car Div., succeeds Mr. Gordon as General Manager. Mr. Ahrens has been elected a Vice-President of the Corporation and has been appointed to the Administration Committee.

Hyatt Bearings Div., General Motors Corp.—The appointment of **H. R. Gibbons** to the position of Chief Engineer in charge of product design, research, application and service engineering has been announced. Mr. Gibbons succeeds **O. W. Young**, who is now Technical Asst. to the Office of the General Manager.

E. I. du Pont de Nemours & Co.—**John R. Griffin** has joined the Petroleum Chemicals Div. Technical Staff as aviation consultant.

GMC Truck and Coach Div., General Motors Corp.—**Vincent P. Blair** has been appointed divisional Comptroller. **William F. Maybury**, formerly Divisional Comptroller, has been placed on special assignments.

Hudson Motor Car Co.—The appointment of **Herbert C. Levis** as used car manager, has been made.

Buick Motor Div., General Motors Corp.—The promotion of **Jesse L. Powers** to General Supt. on special assignments and the appointment of **Stanley White** to succeed Mr. Powers as Supt. of the Buick engine plant, have been announced. **Jerry B. Doll** has been named supt. of the service parts manufacturing plant. He succeeds **T. J. Johnson**, who retired recently.

Willys-Overland Motors, Inc.—After a lapse of several years, **Ferdinand M. Brown** has returned to the company as special assistant to **William S. Venn**, General Sales Manager.

Crosley Motors, Inc.—The appointment by the Board of Directors of **J. L. Armstrong** as Vice-President in Charge of Sales, has been announced. **Stanley E. Kess** has been appointed Secretary of the company.

Ford Motor Co.—The retirement of **H. C. Kellogg**, Director of Purchasing Engineering, has been announced. **Henry Rourke**, former assistant director, will succeed Mr. Kellogg.

The Studebaker Corp. — **Arthur S. Whitner**, Supt. of the company's truck plant at South Bend, has been named manager of the new passenger car assembly plant to be constructed in North Brunswick Township, New Jersey.

General Electric Company—The following personnel changes have been announced by the company: **John L. Busey**, of Bridgeport, Conn., has been elected a Vice-President and placed in charge of marketing policy, a newly-created post. **William V. O'Brien** has been elected a commercial vice-president and appointed assistant manager of marketing policy. **Charles R. Pritchard**, formerly manager of marketing for the Appliance and Merchandise Dept., has been elected President and a director of the G-E Supply Corp.

General Electric Co., Apparatus Dept. —**A. K. Bushman** has been appointed manager of industry divisions in the sales organization; **R. H. Jones** has been appointed asst. to the department comptroller.

Consolidated Vultee Aircraft Corp.—**Hudson Phillips** has been appointed acting director of public relations. **Emmett A. McCabe**, formerly director of public relations, has been reassigned as advertising manager of Convair.

Link Aviation, Inc.—**James F. Baylis** has been named personnel manager to succeed **B. E. Greenslade**, resigned. **H. G. LeClerc** has been named service manager.

Thompson Products, Inc. — **A. L. Pomeroy** has been appointed Director of Development.

Spicer Mfg. Div., Dana Corp.—The promotion of **August Ehrhardt** to the General Tool Engineering staff has been announced. **V. G. Kessler** succeeds Mr. Ehrhardt as master mechanic of the Toledo plant.

(*Turn to page 78, please*)

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

International Trade Fair, Chicago. Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles ..... Aug. 14-16
American Chemical Society, Chicago Sept. 3-8
SAE Tractor Mtg., Milwaukee..... Sept. 11
Veteran Motor Car Club 1950 Glidden Tour ..... Sept. 10-15
Nat'l Assoc. Motor Bus Operators Annual Mtg., Chicago ..... Sept. 13-15
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo ..... Sept. 18-22
British Truck Show, London.. Sept. 22-30
Assoc. of Advertisers Annual Mtg., Chicago ..... Sept. 25-27
Nat'l Metal Trades Assoc., New York City ..... Sept. 27-29
Paris Automotive Show, Paris .. Oct. 5-15
Industrial Pkging. & Materials Handling Expos., Phila ..... Oct. 10-12
SAE Nat'l Transportation Mtg., New York City ..... Oct. 16-18
Nat'l Safety Congress, Chicago. Oct. 16-20
Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20
British Passenger Car Show, London, Oct. 18-28
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago ..... Oct. 23-27
Amer. Welding Soc. Annual Mtg., Chicago ..... Oct. 23-27
Nat'l Lub. Grease Inst., Chicago, Oct. 30-Nov. 1
Amer. Soc. Body Engrs. Technical Convention, Detroit ..... Nov. 1-3
American Petroleum Institute Annual Mtg., Los Angeles ..... Nov. 13-16
Power & Mech. Engineering Exposition, New York City .. Nov. 27-Dec. 2
Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New Your City. ..... Jan. 12-20
Plant Maint. Show & Conf., Cleveland ..... Jan. 15-18
Soc. of Plastic Engrs., New York City Jan. 18-20
Amer. Soc. Tool Engrs., New York City ..... Mar. 17
Pacific Automotive Show, Seattle Mar. 21-24
International Auto Salon, Geneva March 8-18
Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City ..... Apr. 17-20
Nat'l Air Races, Cleveland Airport May 19-20

Necrology

Frank P. Barnes, 59, superintendent of manufacturing, Chrysler Corp.'s Dodge Div., died on July 8 in Detroit.

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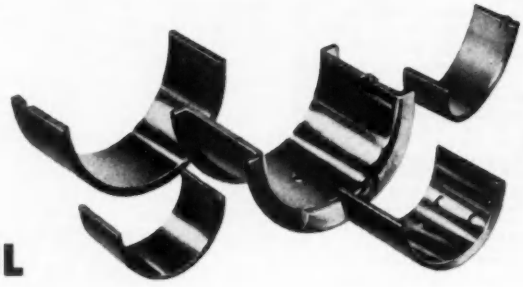

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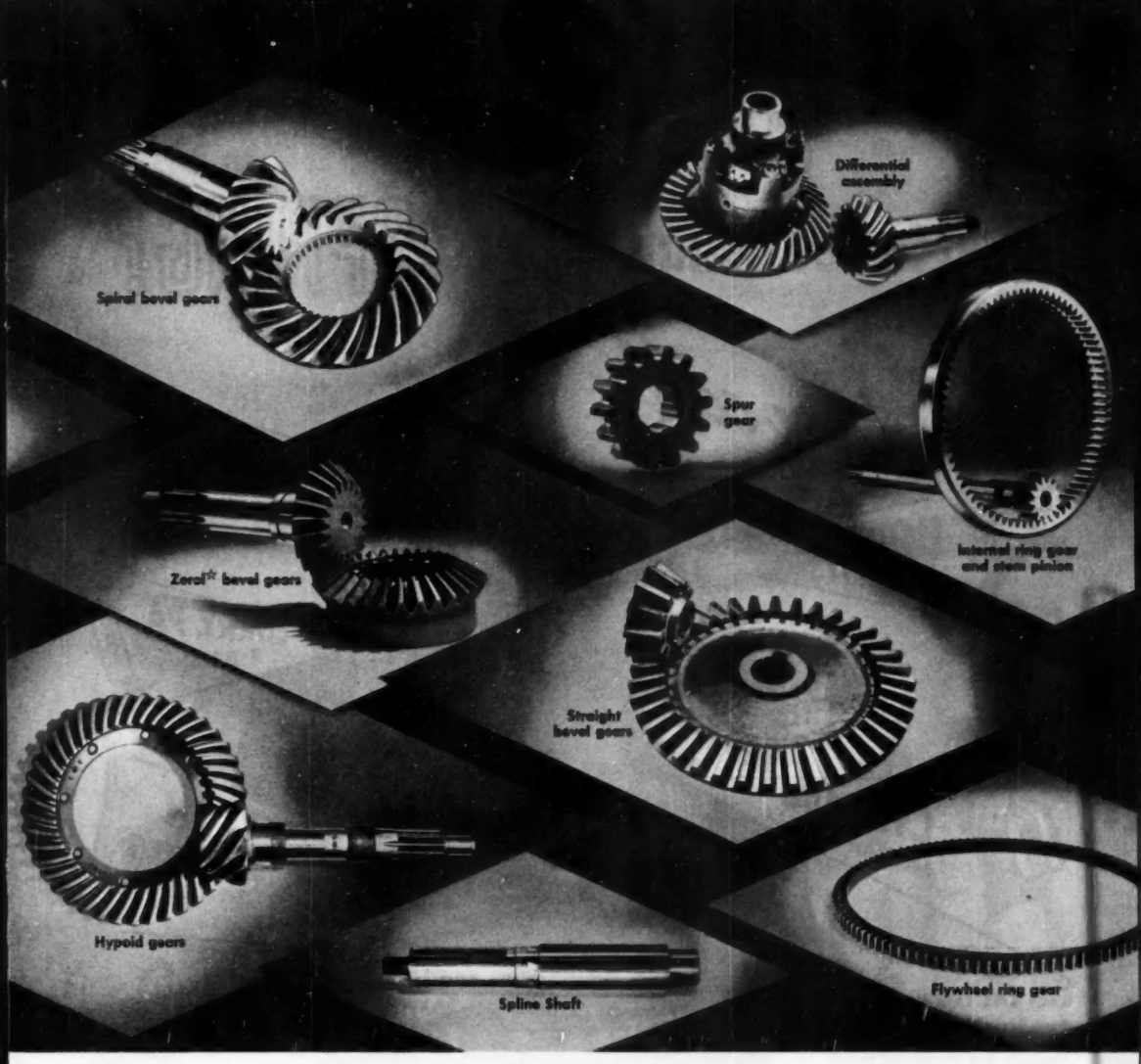

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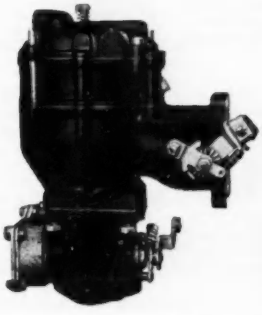

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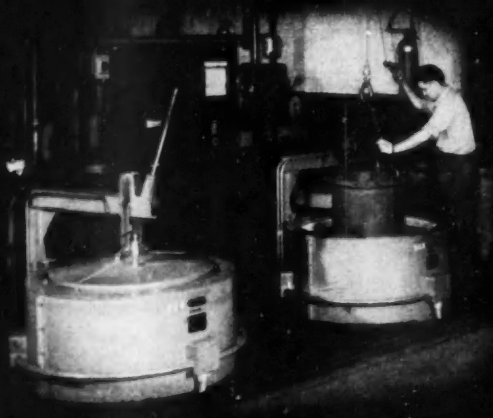

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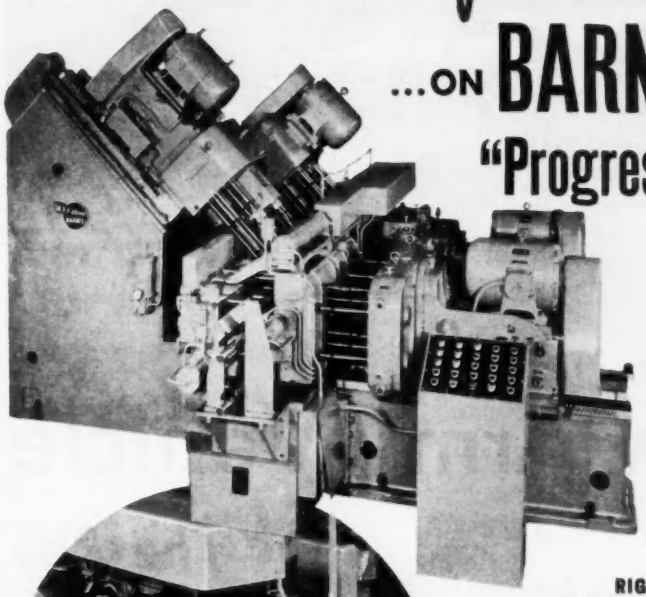
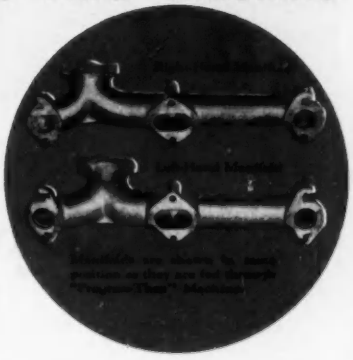
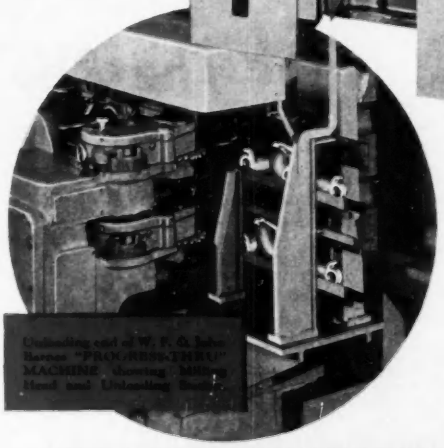
...ON BARNES 6-STATION "Progress-Thru" Machine







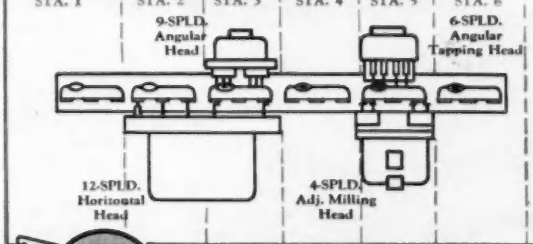
RIGHT-HAND AND LEFT-HAND PIECES MACHINED SIMULTANEOUSLY AT RATE OF 116 PER HOUR

On this Barnes Special 6-Station Automatic "Progress-Thru" Machine, both right- and left-hand automobile exhaust manifolds are drilled, bored, reamed, tapped, and milled simultaneously. Workpieces are loaded, clamped, and transferred through the machining stations in pairs, one above the other. Gross production is 116 pieces per hour on a cycle time of 1.03 minutes. A total of 36 machining operations are performed—17 in the upper right-hand manifold and 19 in the lower left-hand manifold.

CONSERVES FLOOR SPACE, REDUCES WORK HANDLING

The manifolds are received with bosses machined parallel which provide a flat surface for accurate clamping. Plug-type locators in cored exhaust holes and dowel pin locators in reamed flange holes, maintain precise alignment for accurate machining. Loading and unloading is done during the machining cycle. Thus, by combining operations in one machine, floor space is conserved, and work handling is substantially reduced.

SCHEMATIC DRAWING OF OPERATIONS



STATION UNIT OPERATION

STATION 1—Load.

STATION 2—Drill (4) 13/32" dia. in center bosses. Comb. drill and ream (4) .500" dia. in end flanges.

STATION 3—Bore (2) 1 15/16" dia., drill for (6) 3/8"—16 tap, drill 11/64" and .180" dia. (1) in top angular ports (L. H. Head).
Bore (4) 1 3/8" dia. in end exhaust holes (R. H. Head).

STATION 4—Idle.

STATION 5—Tap (6) 3/8"-16 in angular flanges (L. H. Head). Mill (4) slots in end flanges (R. H. Head).

STATION 6—Unload.

W. F. & JOHN BARNES

Call on Barnes Engineers for a free analysis of your machining problems. Find out how these or other Barnes engineered machines can be applied to help you speed production and cut costs.

W. F. and JOHN BARNES

312 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

New Army Vehicle

The Reo

DETAILS of a military truck of advanced character, built by Reo Motors, Inc., Lansing Mich., to meet exacting U. S. Army Ordnance requirement have just been released. Known as the Model M-34, 2½ ton, 6 x 6, it has a wheelbase of 154 in., and will carry a payload of 10,000 lb on the highway or 5000 lb cross country. This vehicle is capable of a maximum speed of 60 mph, with rated load on the highway, can negotiate a maximum grade of 60 per cent, will maintain a speed of 30 mph on a constant grade of 3.8 per cent, and has a cruising range of 350 miles at 35 mph.

M-34 undergoing tests in deep mud with trailer load.

Among the special requirements of the new truck is the ability to operate in water to a depth of seven ft.

The Model M-34 is capable of a speed of 60 mph with a payload of 10,000 lb. It will maintain a speed of 30 mph on a 3.8 per cent grade

M-34 Truck

By Joseph Geschelin

Impressed on these characteristics are some really amazing specifications. For one thing, the vehicle must be capable of normal operation in air temperatures ranging from —65 F to 125 F. Still another requirement is the ability to ford water to a depth of seven ft.

To meet the latter requirement, the Reo Gold Comet engine is completely waterproofed and, under tests, has shown ability to run indefinitely while completely immersed; and to start after being stopped while immersed. In addition, various parts of the vehicle that require breathing are vented to a manifold system to be described later. In preparation for fording the vehicle carries an underwater kit consisting of standpipes or breathers for the induction system and tailpipe, termed tentatively as the "schnorkel" and "snorter."

One of the most important elements of this vehicle is a unique type of transfer case, the Model T-136, supplied by Timken and incorporating some performance features not available heretofore in a vehicle of this size and character. It is of two-speed type with forward ratios of 1 to 1 and 1.98 to 1, with constant mesh gearing and synchronized shift for both speeds.

The unusual feature of this unit is the provision of an automatic means of engaging the front axle drive. Regardless of the direction of the vehicle, this is accomplished through a double overrunning clutch on the front output shaft, which in combination with a reduction gear set, is arranged to drive the front axle output shaft at a slower speed than that of the rear output shaft. Consequently, positive drive to the front axle is not effective unless the rear wheels slip or until sufficient wind-up takes place in the rest of the running gear to absorb the difference in ratio of output shafts.

The transfer case also incorporates a power take-off of full power type which can be operated while either on the full run or at standstill. In addition it carries a Duo-Grip parking brake capable of holding the vehicle on a 60 per cent grade in either direction.

The transfer case was designed for a single drive line tandem axle arrangement with one output shaft

(*Turn to page* 60, *please*)

Condensed Specifications

Reo Gold Comet Engine
Model 331 OA—Military

No. Cylinders	6
Type	Valve-in-Head
Bore (in.)	4 1/8
Stroke (in.)	4 1/8
Displacement (cu in.)	331
Compression ratio	6.73 to 1
Bhp (max)	145 at 3400 rpm
Torque (lb-ft, max)	270 at 1400 rpm

Part One

Here Is Presented an Authoritative Analysis of the Pattern and Potentials of the Economy Behind the Iron Curtain Based on Years of Study of the Comparative Resources of the Soviet Union and the United States, Now the World's Greatest Industrial Nations.

What Is

THIS sketch of Russia's economy embraces three general topics—a characterization of its distinctive features, a summation of developments over the past decade, and the implications drawn from these developments. Emphasis has been placed upon operating factors and processes, rather than on detailed statistical measures; and the figures used here must necessarily be regarded only as approximations.

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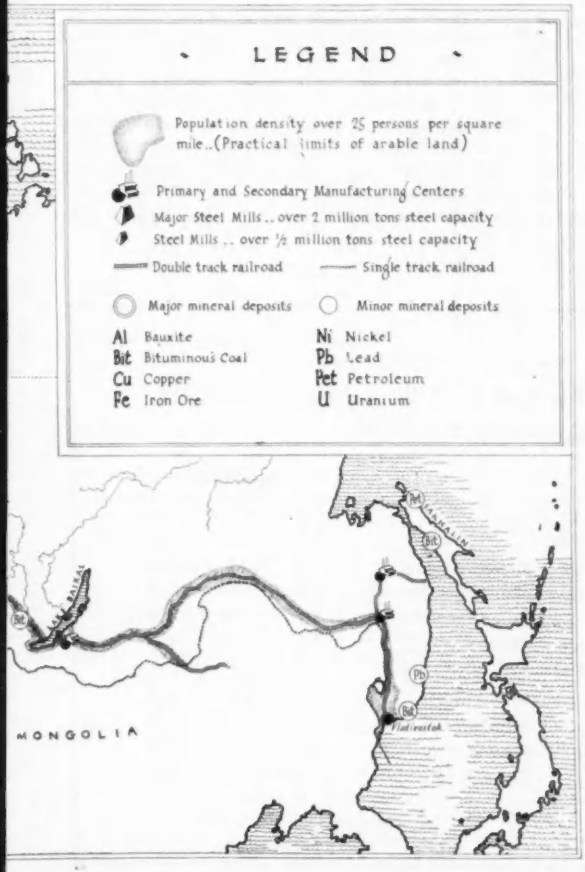
Russia's Industrial Strength?

By Demitri B. Shimkin

Consulting Editor of AUTOMOTIVE INDUSTRIES on Russian Industrial Affairs; Russian Research Center, Harvard University

The economic structure of the Soviet Union is profoundly different from that of the United States. Distinctive factors of strength and weakness are present in Russia's population composition, agricultural resources, mineral resources, development of transportation, technology, and economic management. Let me discuss each of these in detail.

POPULATION—At present, the population of the Soviet Union, including the regions incorporated over the past decade but excluding the satellites, totals 200 million, a third greater than that of the United States. However, the higher Soviet birth rate is reflected by the number of children under 15 years of age, 55 to 60 million, or about twice the American number. The same disproportion exists for men 20 to 24 years of age, but the tremendous Soviet losses in World War II have reduced the male population of ages 25 to 44 to simple equality with the United States. Furthermore, the Soviet Union is still a rural nation; currently, between 50 and 55 per cent of the population is engaged in agriculture, compared to less than one-fifth in this country. Consequently, the non-agricultural labor force of the United States in 1948 actually exceeded Russia's in 1949 by some 28 per cent (excluding the Armed Forces in both instances). The man-hour input in the industries of the two countries was, however, comparable, since the Soviet industrial labor force has been on a work week of 48 hours and more since the end of World War II. Finally, qualitative differences between the populations and labor forces of these two nations must not be forgotten. Only about half the Soviet population consists of Great Russians; less than a fourth, of other Slavic groups; and the remainder, of Turkish and other less educated and less assimilated minorities. Also, women made up 50 per cent of the Soviet non-military industrial labor force in 1949, almost the proportion observable at the height of the war. Compulsory child labor, from the age of 14, also has been widely employed since 1940. These factors, plus much lower capital equipment, help explain an average Soviet man-hour industrial productivity not greater than 20-25 per cent of the American.



AGRICULTURAL RESOURCES—Although the Soviet Union, within its present boundaries, approaches the United States in arable acreage, its agricultural potentialities are far more limited. Too cold a climate precludes large-scale development of high-yield maize; too dry a climate inhibits the intensive fertilization needed for large potato and wheat crops, as in Western Europe. Thus the USSR, with a population one-third greater than the United States, has a total grain output half as great. Normally, the nation can provide a small surplus of grain, but is faced by chronic deficits of fats and proteins, since

livestock numbers today scarcely exceed those of Imperial Russia on the eve of World War I. Fish, two-thirds of which are caught off the North Russian and Far Eastern shores, consequently play a major role in the Soviet diet. Furthermore, Russia's agricultural future is uncertain. Crop failures have marked the past. In at least one year out of five since 1885, and most recently in 1946, droughts have cut yields by a quarter or more—and are certain to recur. In addition, almost all the readily-cultivable land is now in use; yet the Soviet population keeps growing at some 1.5 per cent per year. Large-scale land improvement, seed selection, and comparable measures can, of course, go far in easing this serious condition, but the actual policies pursued today—especially the rejection of scientific genetics—court disaster.

What Is Russia's Industrial

MINERAL RESOURCES—At current consumption rates, Russia's known reserves are adequate for prolonged self-sufficiency in all steel-working minerals except molybdenum and tungsten, in fuels, and in chemicals such as the fertilizers and sulfur, but serious weaknesses exist in non-ferrous and rare metals, and in abrasives. Definite deficiencies exist in aluminum-grade bauxite, bismuth, cadmium, lead, silver, cerium and rare earths, uranium and zinc, as well as previously mentioned molybdenum and tungsten, among metals. Deficient non-metallics comprise corundum, industrial diamonds, bearing jewels, piezo-electric quartz crystals, and high-grade talc.

Four general remarks will help clarify the mineral position of the Soviet Union. First, it must be stressed that reserves are relative. Thus, at a consumption level equal to that of the United States in 1944, Russian reserves of nickel, cobalt and copper, for instance, would be exhausted within a decade. Secondly, a distinction must be drawn between reserves and production. For example, while Soviet reserves of the fuels and of andalusite are great, current output is relatively modest. Thirdly, the distribution of mineral deposits is very uneven. All but five per cent of the ascertained iron reserves lie west of 63 deg East, while 91 per cent of the coking coal reserves are located east of this line. Virtually all Soviet petroleum is concentrated in the Caspian Sea-Volga River basin; Siberia is totally lacking in proved petroleum reserves except for the island of Sakhalin. The bulk of Soviet copper, lead, and zinc resources are in Kazakh Republic, far from industrial centers. Nearly six-tenths of Soviet nickel, a third of its cobalt, and other critically important reserves lie north of the Arctic Circle. Only in the Urals—with 25 per cent of all Soviet deposits—and in the Ukraine are minerals closely grouped (see map). Thus the problems of mineral development are inextricably woven with the development of transportation, shifts of population, and the industrialization of remote regions. Fourthly, Soviet mineral supplies must be viewed in relation to the entire Soviet sphere. In some cases, the satellites can

Table 1 Relative Man-Hour Input Per Unit for Old and New Models of Automotive Electrical Equipment in the USSR

	Prewar Models				New Models			
		Prewar	1/1/48	IV Qr. 48		1947	IV Qr. 48	Plant
Plant	Unit	Actual	Actual	Plan	Unit	Actual	Plan	Design
ATE-1	Generator GBF-4600	2.00	2.09	1.9	Generator G-15	6.0	4.0	1.61
	Starter MAF-4006	2.05	2.21	2.0	Starter SG15 (less relay)	7.8	5.00	2.08
	.....	....	....	....	Relay for governor PP15	6.3	4.5	1.78
KATEK	Coil 1G-4085	0.4	0.46	0.4	Coil B21	1.8	1.4	0.35
	Generator GBT-4692	1.21	2.68	1.21	.....	....	....	....
LENKARZ	.....	....	....	....	Carburetor K49	11.6	7.5	2.75
	.....	....	....	....	Carburetor K37	1.2	0.85	0.65
KRASNYI	Headlamp 50-00	....	0.84	0.7	Headlamp FG2	1.55	1.1	1.15
OKTYABR		....	....	....	Headlamp FG7	1.5	1.1	0.78

Strength?

provide large quantities of deficient minerals to the USSR. Barite, high-grade talc and tungsten are outstanding examples. In general, however, the satellites are weak in known resources, and their needs, should industrial development be seriously undertaken, would represent a measurable drain on Soviet mineral resources.

The uranium resources of the Soviet sphere deserve special mention. Within Russia, two areas appear most significant. In Central Asia, within 250 miles of Tashkent, at least five deposits had been discovered by 1944. They are all low-grade uranium-Vanadium deposits, with U_3O_8 contents rarely averaging as much as one per cent, although very rich stream-deposited pockets of ore may run over 50 per cent U_3O_8. For large-scale production, formidable problems of water supply, power and ore-dressing technique must be solved. In the other region, stretching from Lake Baikal 500 miles northeast, are Pre-Cambrian formations characterized by numerous deposits of betafite (Nb-Ta-U) ores comparable to those known in Madagascar. Although none reported through 1944 have commercial significance, discoveries of major size are possible here.

In Germany, the Soviets are working old mines with very lean, complex U-Bi-Co-Ni ores. Between 1939 and 1943 the Germans themselves had mined 44,000 metric tons of these ores, recovering a total of 35 metric tons of U_3O_8 over the entire period. Granting even a very large expansion of operations since the war, the recovery of enough uranium to develop a formidable stockpile from this source is very improbable. The Joachimsthal deposit in Czechoslovakia also appears to have limited resources, but the Bulgarian deposit at Bukhovo, northeast of Sofia, is more promising. The latter is associated with a granitic intrusion into Pre-Cambrian or Paleozoic formations; copper-uranium-mica minerals are concentrated in the contact zone. In 1943, reserves were stated to be 25,000 metric tons of ore with two per cent uranium. In all, the uranium resources presently known for the Soviet sphere are far inferior to those to the Western powers.

THIS exclusive article on the Russian industrial economy is being published in AUTOMOTIVE INDUSTRIES in two installments. Following this first part on Soviet mineral resources, transportation system and manufacturing technology, the economic development of Russia during the past 10 years will be analyzed in Part Two and it will be shown how the Soviets through the utmost use of their capacity have recovered from the severe losses of the war and that again their industrial output is shifting westward, a phenomenon of great political and military significance. A comparison of the industrial power of Russia and her European Satellites with that of the United States, United Kingdom and Canada will be presented in tabular form.

Demitri B. Shimkin, the author, who is an authority on the Soviet economy, is Consulting Editor of AUTOMOTIVE INDUSTRIES on Russian Industrial Affairs and is well known for his outstanding article, "The Automobile Industry That's Behind the Iron Curtain," which was published early in 1948 by AUTOMOTIVE INDUSTRIES, and later was dramatized by the Columbia Broadcasting System on its radio network. During World War II he was an officer on the U. S. War Department General Staff and the following two years was on the staff of the National War College in Washington. His book, "Minerals—A Key to Soviet Power," is scheduled to be published by the end of this year. He was assisted in the preparation of this current article by Gregory Grossman, of the Russian Research Center staff.

POPULATION, RESOURCE DISTRIBUTION AND TRANSPORTATION—For its maximum economic growth, the Soviet Union requires a far-flung, high-capacity system of transportation. Up to the present time, 80 per cent of its people still reside west of the Leningrad-Volga River-Caspian Sea line. This area as a whole is deficient in mineral resources and lacking in cotton. Within this area, the major administrative, cultural and manufacturing cities of Central Russia—Leningrad, Moscow, Gorkii and others—depend on the Ukraine and remote, arctic Vorkuta for most of their minerals; on the Ukraine, North Caucasus and lower Volga for much of their food. Likewise, chronic deficits of food in Central Asia and in the Soviet Far East must be met by shipments from rich Western Siberia. The high concentration of vari-

(*Turn to page 64, please*)

Metal Adhesives

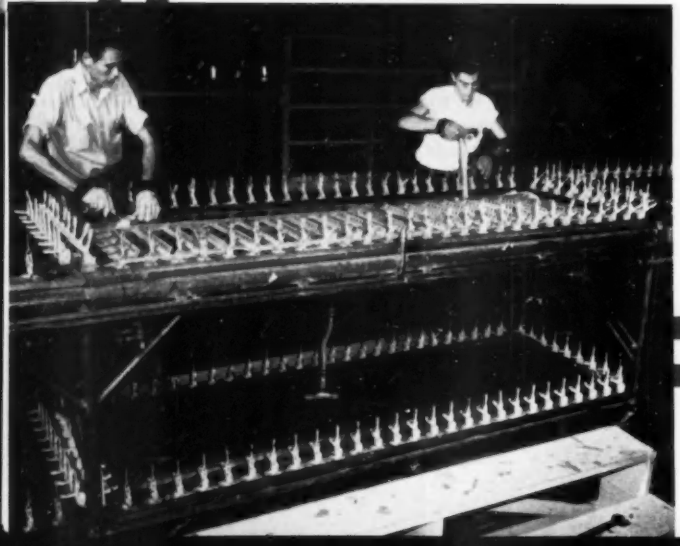
for Bonding Aircraft

Use of Convair's "Metlbond" Has Increased Until Now About 5500 Sq Ft of the B-36 Bomber's Skin Assemblies Are Attached by This Method.

CONSOLIDATED VULTEE AIRCRAFT CORP. first became interested in the use of metal adhesives for aircraft some years ago. Company engineers felt that, if a satisfactory adhesive could be developed, they could simplify and improve aircraft structures and achieve better production assembly methods. It appeared, also, that weight saving could be accomplished by using thinner skin than would be practical when employing more conventional fastening methods.

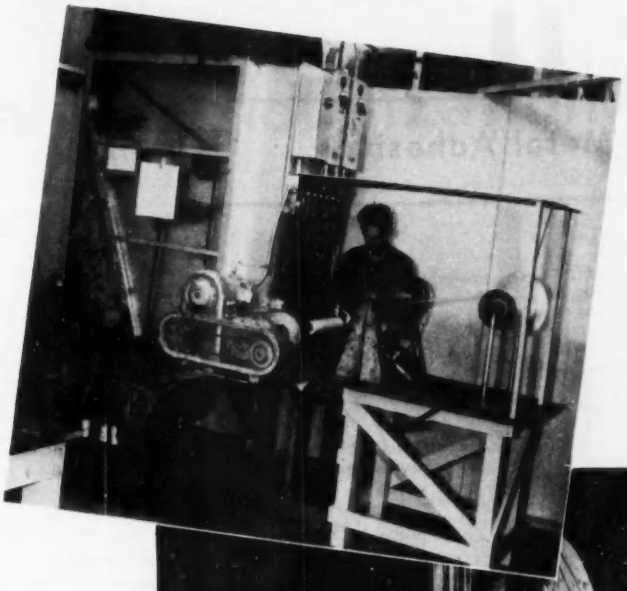
Convair was successful in developing several metal adhesives, two of which, M3C and N2, have become outstanding. Excellent results were obtained by using a combination of these two cements. The flexible metal adhesive, M3C, establishes a bond to the metal surfaces. The low-pressure adhesive, N2, which is thermoplastic prior to cure, equalizes pressures by filling small irregularities resulting from imperfectly matched parts or imperfect tools. This combination in separate layers produces a bond which consistently develops adequate shear strength and flexibility. The trade name "Metlbond" was given to the process.

After development of the adhesives came laboratory testing to determine environmental effects, fatigue resistance, and other properties. For magnesium, it was necessary to develop a combination which would give good surface protection as well as a high bond strength. Tests of numerous combinations showed that a magnesium alloy surface, treated with Convair's anodic process, Manodize, followed by a thin dip coat of zinc chromate primer, would meet these requirements. The shear strength was less than that obtained with clad aluminum alloy, but it was adequate for most design requirements.



Removing cured part from pressure fixture. Care in handling is necessary at this state of Metlbond process because, at the elevated temperatures used, magnesium alloy is somewhat susceptible to deformation.

Assemblies

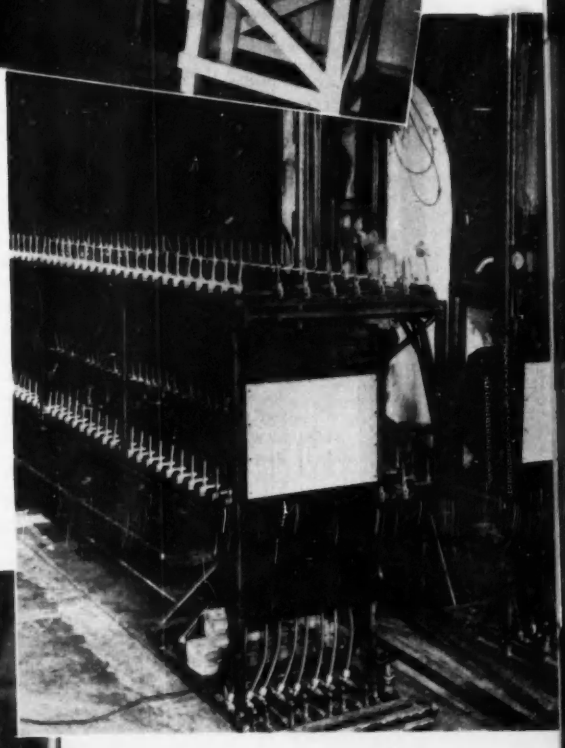


This machine is used to make sheets of Metlbond film. Nylon parachute cloth runs through a tank of N2 cement, passes through a heated box to evaporate the solvent, is dipped into a tank of M3C cement, and is finally dried again in the same heated box.

The adhesives were also found to be very resistant to fungus, high humidity, and temperature changes. Laboratory tests were originally conducted at temperatures from —75 to a +165F. However, planes containing Metlbonded assemblies have encountered temperatures as low as —100F, at high altitudes, without any apparent adverse effects on these parts.

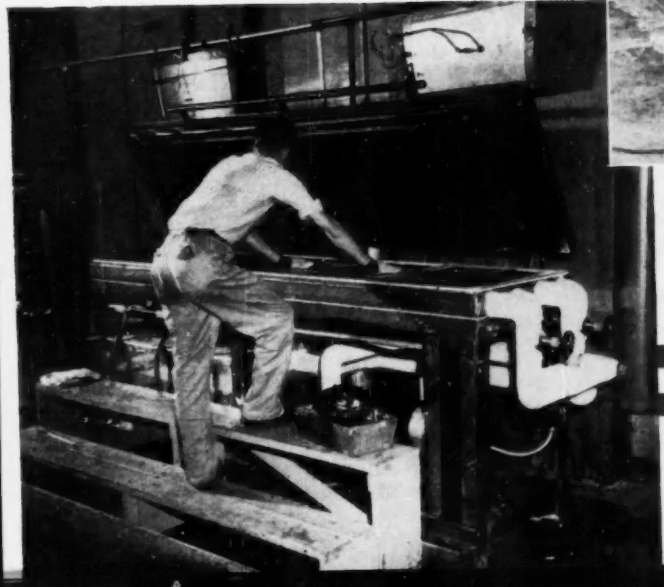
Metlbonded joints are said to have shown excellent resistance to the normal cleaning compounds to which they may be subjected in service; and fuels and oils seem to have little effect on them.

Fatigue resistance of the Metlbonded joints ap-



Pressures on parts being fabricated with Metlbond are controlled while heat is being applied in this pressure fixture and curing oven. Because of the low pressure required, atmospheric pressure is sometimes used by creating a partial vacuum.

The new type-oil-heated fixture shown here is now undergoing production tests, and results indicate that curing cycles of only thirty minutes per assembly are possible.



Metal Adhesives

pears to be excellent, for to date none has been known to fail as a result of normally applied fatigue loads.

Metlbond film, when applied to unprimed clad aluminum alloy in accordance with the methods described here, must be capable of developing a shear stress of at least 2500 psi, in bonds to bare 0.064 in. clad 24S-T aluminum alloy standard panels, with ½ in. overlap. A typical value is approximately 3000 psi. Ultimate design shear stresses in joints between clad aluminum alloy parts must not exceed 1000 psi. When applied in accordance with the methods described, to primed magnesium, the film must be capable of developing a shear stress of at least 750 psi, in bonds to primed 0.064 in. Fs-1h magnesium alloy standard test panel, with ½ in. overlap. A typical value is approximately 1400 psi. Ultimate design shear stresses in joints between primed magnesium alloy parts or between primed magnesium alloy and clad aluminum alloy parts must not exceed 250 psi.

Metlbond cements were originally applied by spraying to the surfaces to be joined. A better method has recently been developed, however, which permits the cements to be deposited on a thin fabric base, thus avoiding most of the spraying and all of the oven-drying operations. This dry film method of applying Metlbond cement opened up the possibility of manufacturing aircraft parts on a high-production assembly basis.

Other modifications to simplify the process still further are now being studied. For instance, it was originally thought that the prepared Metlbond film would be damaged by exposure to elevated temperatures during shipment and storage, and that the film would have to be stored in solvent vapor to prevent its complete drying. Tests and actual usage have proved, however, that storage of the film at a temperature of 160F for 30 days does not affect the strength of the final bonds, when the material is used in accordance with current production procedures. Experience has shown, also, that if the surface of the film has dried to the extent that it will not adhere readily to areas to be bonded, it may be reactivated in a simple manner.

Studies are now being made with the application of the film directly to cleaned metal surfaces, omitting the preliminary spraying with M3C cement. Laboratory results, to date, appear promising. Should further investigation indicate that some of these and other improvements can be used successfully in production, further simplification of the process will result.

To date, the process has been used primarily on clad aluminum alloy and on magnesium alloy. It is applicable also to ferrous and to additional non-ferrous metals, but processing methods have not been fully investigated. Materials which need further investigating prior to extensive use of Metlbond include unclad aluminum alloy, bare steel, plated steel, thermosetting plastics, wood, and rubber. Most of the Metlbond assemblies used on the B-36 at present are of magnesium alloy. It is of interest that approximately 5500 sq ft of the B-36 bomber's exterior surface consists of assemblies which have been attached to stiffening members and doublers by the Metlbond process. Aluminum alloy stiffeners are used on magnesium alloy sheet, however, where design or production improvements result. This combination of materials causes no difficulty.

Cleaning of detail parts is the first required operation in fabricating Metlbond assemblies. All aluminum alloy parts are first cleaned in a vapor degreaser us-

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Metlbonding was employed to make this B-36 wing trailing edge panel assembly.

Effects of Partial Mobilization

By Karl Rannells,
Washington Bureau,
AUTOMOTIVE INDUSTRIES

No special impact on production in the automotive industries seems to be in the cards during the current partial mobilization so long as the trouble remains centered in Korea. Supplies of steel and other metals, of course, will be a problem. The situation regarding civilian vehicle output will tighten as the priority and allocation powers asked by the White House are brought into play in order to obtain materials for varied defense production.

Despite the lapse of time since World War II, Government agencies have not yet worked out a concrete, overall blueprint for industrial mobilization for civil and national defense. There are numerous reasons, including the long span of months during which the National Security Resources Board was without an active, full-time head.

Nevertheless, the Munitions Board has virtually completed its own war plan for substantial portions of the automotive and other industries. As part of this plan, a large number of standby orders has gone out to automotive manufacturers.

For working purposes these are known as "production schedules" which have been worked out in cooperation with the manufacturers. Ostensibly, they constitute an agreement between a procurement agency and the manufacturer as to what and how much could be turned out in a given time by specific plants. Schedules for the first year are estimated on a quarterly basis.

"These production schedules are actually defense orders," a Board spokesman told AUTOMOTIVE INDUSTRIES. "They immediately go into effect without further ado if full mobilization should be ordered."

It is not quite that simple, of course, but it does mean that production does not have to grind to a standstill because of red tape. In other words, the manufacturer knows what and how much is wanted, and production goes ahead while the actual details such as costs and prices then applying are being determined and agreed upon. Provision for renegotiation permits this procedure.

Such production schedules will have been completed for an initial list of 700 essential key items not later than September 1, the Board says. Everything on this list would have top priority for defense. Other items will be added to the list in the order of their importance to defense or their probability of becoming a bottleneck to production of end products. Each schedule will be constantly reviewed and kept up to date in light of both plant capacity and changes in requirements.

Identities of individual plants for which "production schedules" have been approved, together with the specific items on the list and the quantities needed, are necessarily kept under wraps as classified information. However, officials do not hesitate to say that the list of 700 initial items includes complete vehicles, marine, tank and aircraft engines, parts, and many other items made by the automotive industries during World War II.

But this is only part of the picture. Many of the items now being scheduled or allocated would require little or no change-over in equipment.

In the event of all-out mobilization, as distinguished from the present partial effort, one of the biggest problems in working out all-out war production schedules would lie in determination of what items and what part of production would have to be set aside for civilian supply. World War II proved that there must be a minimum established for civilian requirements if the war machine is to be kept running.

Of necessity, the only standard by which the Munitions Board and the National Security Resources Board can proceed is to use percentages of distribution during the last war as a yardstick. Studies have been made of these needs, and under varying conditions. The only standard by which the National Security Resources Board and the Munitions Board can proceed is the percentages of distribution during the last war.

For instance, 88 per cent of motor vehicles and parts production went into military and export (to the Allies) requirements. So did 82 per cent of automotive electrical equipment and 54 per cent of all types of batteries. Could the same percentage be applied today?

There are divergent opinions here. One is that restrictions on motor vehicle production could not be so tight. It is argued from Labor Department estimates that a new high of 70,000,000 workers would be required for a war at this time, and neither expansion nor modernization of transportation facilities since 1945 has been sufficient to carry such a load.

There are now several million more cars in operation than during the war. Theoretically, this means a much greater availability of private transportation. But despite new postwar highs in factory output, over-all production has not been sufficient to pull the ratio of over-age cars back to anything near prewar levels. Not only would replacement parts needs be greater, but the probable scrappage rate would be higher.

Largely in view of this, current timing leans toward a stop-sales order rather than an immediate stop-production edict should the emergency grow worse. A defense department official says frankly that the Munitions Board would not hesitate to stop all automobile production if necessary but that it wants to avoid this if possible. This is why the Munitions Board is trying to determine plant-by-plant both current and potential "production hours." It wants to work out a schedule by which a substantial output could be reversed for non-military domestic needs.

Even with production schedules ready, still another problem faces the industry should full mobilization become necessary. It is the physical conversion of plants where schedules call for a different type of production from current items. The Government has sold numerous war plants under the

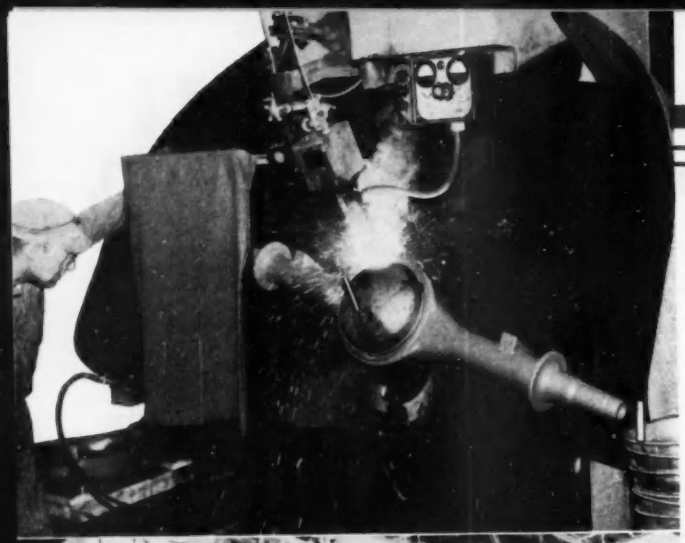
(*Turn to page 78, please*)

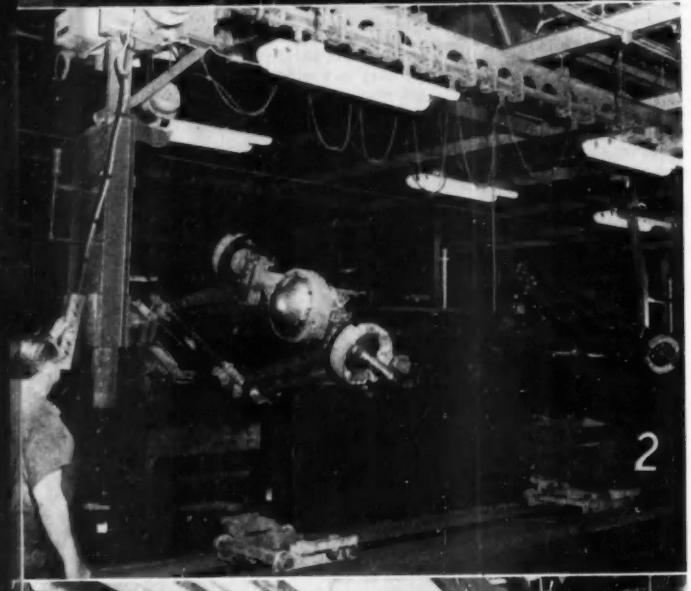
First Order

As we go to press partial mobilization is taking form fast and the latest views in the Nation's Capital on how the automotive industries may be affected are presented in this article. In Detroit announcement was made regarding the first tank order to an automotive company — General Motors—for 28-ton tanks to be built at a Government standby plant in Cleveland used by Fisher Body during the war for the production of aircraft engine nacelles.

Consequently, the pending contract will have no effect on automobile production insofar as facilites are concerned, but it might have some effect from the materials standpoint. Cadillac will have direct supervision of the tank project. Transmissions used in the tanks will be supplied by the GM Allison Division.

It is reported that GM will build 40-ton tanks in addition to the 28-ton size, and that both will be powered by Continental aircooled engines.





Many

By
Joseph
Geschelin

IN conjunction with the most ambitious truck program in its history expansion and modernization of the Fort Wayne Works of the International Harvester Co. has involved an expenditure of over $8-million. This includes a complete metamorphosis of the final truck assembly floor as well as the installation of some 171 new machine tools of special and standard types.

Among the newest pieces of equipment is an extensive two-unit Bonderizing and painting installation, one unit for complete cabs; the other for

1. *This new Shield-O-Matic arc welding machine, built by National Cylinder Gas Co., is used for seam-welding the oil pan to the housing. The safety curtain has been moved away to show the operation in action.*

2. *In the usual manner the front and rear springs suspensions together with front and rear axles are installed with the frame up-side-down to facilitate the work. At this point the subassembly enters the newly built turn-over fixture which makes it easy to turn the chassis into normal position for final assembly.*

3. *A suspended conveyor section is introduced at the end of chassis assembly to carry the chassis through paint spray and drying. This view, taken near the end of the suspended conveyor, shows the mounting of wheel and tire assemblies while the chassis is suspended. It also shows clearly the detail of the balanced type carriers employed on the suspended conveyor.*

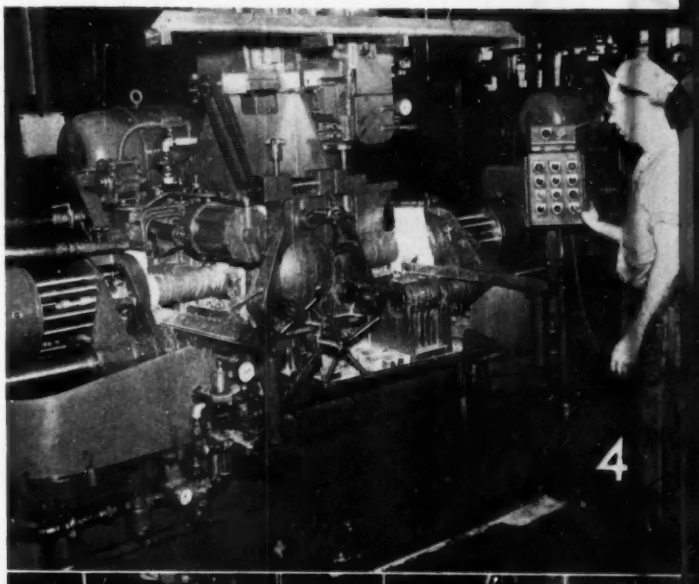
New Machines
at IHC Truck Plant

sheet metal. The Bonderizing unit for complete cabs is an enormous piece of equipment built by Newcomb-Detroit, including a five-stage washer and dry-off oven adjacent to the washing unit.

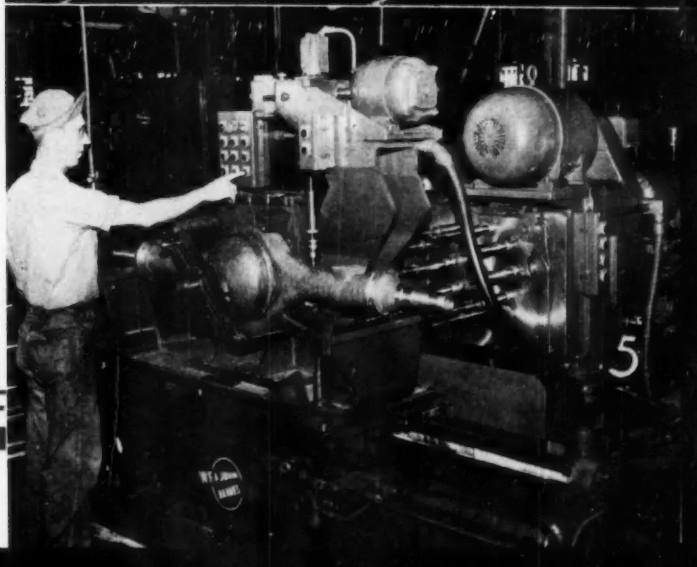
The Fort Wayne plant also made a radical change in its heat treating department. Featuring a unique type of oil quenching procedure, the setup is said to have resulted in the elimination of heat treat distortion in big ring gears and other parts, and is expected to make possible the substitution of lower priced steels to replace expensive alloy steels for highly stressed parts.

Among the many items of special machinery incident to this program are four pairs of machines for rear axle housings. Illustrated is the pair for the smaller L-120 housing. The larger of the two machines is a three-way W. F. & John Barnes unit for drilling the backing plate holes at the two axle ends, and for boring and facing the banjo flange in the center unit. To start the operation, the housing is mounted in the machine and located from the wheel bearing ends at each extremity. The work is then air-targeted and clamped. The operator cannot start the machine in cycle until locating target is back in normal position which is controlled by an air valve, thus clearing the way for machine operation.

(*Turn to page 74, please*)



4 ■ *Intimate view of one of the W. F. & John Barnes automatic cycle machines for drilling backing plates and boring at the center in one setting.*



5 ■ *The companion—second operation—W. F. & John Barnes machine on axle housings. As described in the text it does the drilling and tapping of the carrier flange. It is a two-station machine — drilling the cluster in the position shown, then tapping in the station at the right. The single tapping spindle may be seen directly in the center at the tapping station.*

10 Speed Transmission

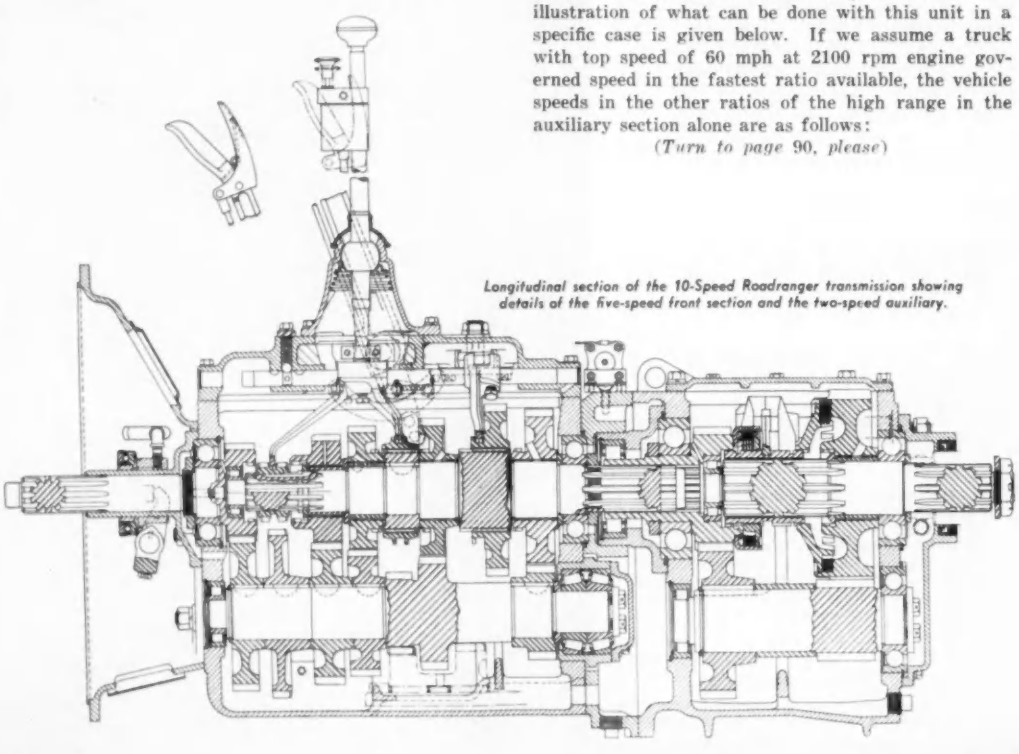
Has Single Control Lever

New Heavy Duty Fuller Unit Features Pre-Selective Shifting of Two-Speed Auxiliary When Five-Speed Front Section is Shifted Into Neutral

A 10-SPEED heavy duty transmission with single lever control having features of interest to engineers and operators alike has been announced by the Fuller Manufacturing Co., Kalamazoo, Mich. Known as the Roadranger it is essentially a two-range transmission having a five-speed front section combined with a two-speed—high and low range—auxiliary. A unique feature of this design is that the auxiliary is shifted automatically into the desired range whenever the front transmission is shifted into neutral, provided the driver signals a shift by pre-selecting that range before shifting the front section into neutral. Pre-selection is accomplished by pushing or pulling a button attached to the gear shift lever.

In keeping with current trends in heavy duty vehicle operation, the Roadranger has been designed to provide uniform and closely spaced steps between ratios so as to obtain maximum performance. An illustration of what can be done with this unit in a specific case is given below. If we assume a truck with top speed of 60 mph at 2100 rpm engine governed speed in the fastest ratio available, the vehicle speeds in the other ratios of the high range in the auxiliary section alone are as follows:

(*Turn to page* 90, *please*)



Longitudinal section of the 10-Speed Roadranger transmission showing details of the five-speed front section and the two-speed auxiliary.

British Ford Launches $34 Million Program

LONDON, ENGLAND

FORD MOTOR CO., of Dagenham, has embarked on a 34 million dollar re-equipment program to be spread over the years 1950, 1951 and 1952. This provides for the production of new models which will be shown for the first time at the London exhibition in October. A new battery of 48 Coppee underfired coke ovens is already under construction. The North bay at Dagenham is being equipped for tractor assembly, and the construction of a new 150,000 sq. ft. building is going ahead.

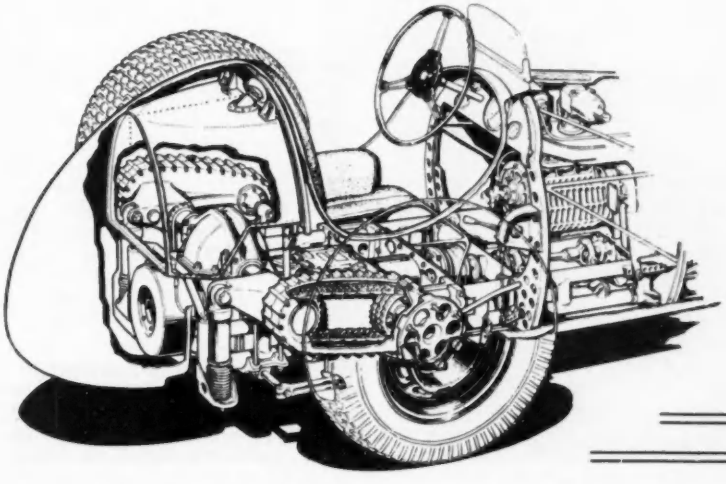
The bulk of the purchases necessary to carry out the Ford program will be made in the United Kingdom, but certain unavailable specialized machine tools will be imported from U.S.A. The British Government has made dollars available for these essential purchases by drawing the necessary sums from the E.R.P. allocation by arrangement with the E.C.A. English Ford exports to North America, however, justify the belief that an equivalent amount of dollars will be earned by the company within a short period.

During the first six months of this year the Dagenham factory produced 100,890 vehicles, compared with 151,793 during the whole of 1949. Exports during the first half of the year were 82,900 automobiles, an all-time record. (*Turn to page* 92, *please*)

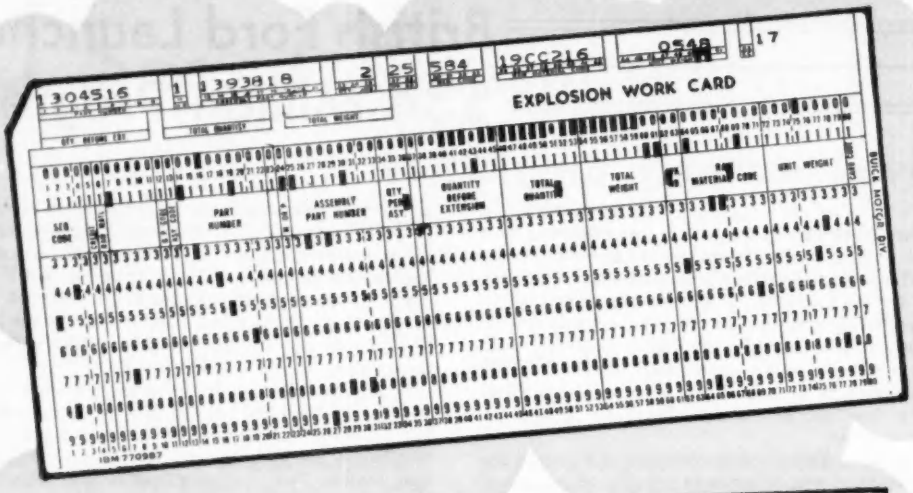
British Race Car Has Unique Chain Drive

A NEW race car designed for short-distance events and incorporating a number of unusual features has been built recently for Raymond Mays, the well-known British driver. In order to permit maximum use of engine power on short sprint courses, the front/rear weight distribution is approximately 33/67. This concentration of weight on the rear wheels is achieved chiefly by mounting the engine well back in a short, light frame and by the employment of a transmission designed for mounting back of the driver.

Because of its special design, the transmission permits a low position for the driver's seat and facilitates installation of a unique rear suspension. A short propeller shaft transmits power from the engine to a Borg and Beck clutch located under the front of the driver's compartment, and another short shaft leads to the four-speed epicyclic transmission. This transmission is bolted to the underslung worm drive case and the assembly is bolted rigidly to the frame. Short tubular axle housings extend from each side of the case to carry the axle shafts and to act as mountings for two cast assemblies which support the rear wheels (*Turn to page* 86)



Cutaway view of Raymond Mays' new car showing details of the chain drive, air struts for springing, rear brake, stabilizer bar, etc. (Courtesy of The Motor, London).



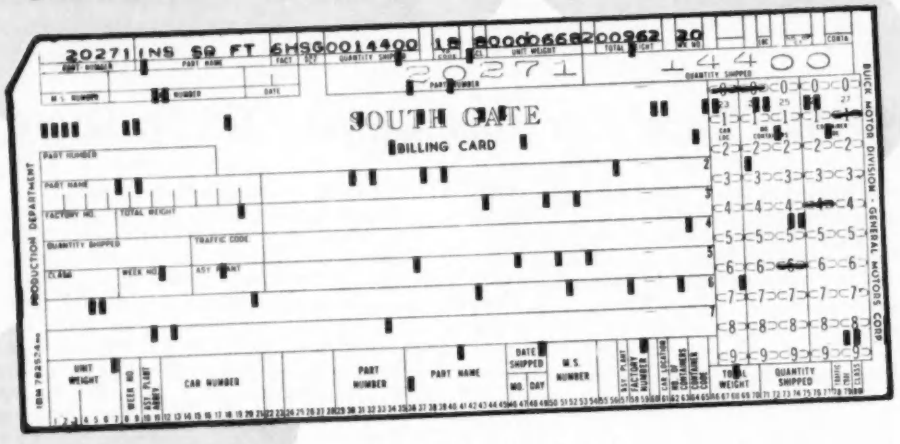


Fig. 1 (Top) "Explosion Work Card" is a good example of one of the types of intricate problems suitable for lightning handling in the IBM electronic computor.

Fig. 2. The "Billing Card" is another example out of the many possible solutions to problems ordinarily requiring a good deal of manpower and time when handled without the benefit of the modern electronic calculator.

IN line with its policy of replacing old or inefficient machines with the latest equipment available, Buick has recently placed in operation the newest version of the IBM electronic computer. As illustrated, the unit consists of the first cabinet—the computor or calculator—and the second station which is the punch element.

Capable of punching 6000 cards an hour, the IBM lightning calculator has an output equivalent to 36 of the older mechanical computers used by Buick during the war. It may be noted at this point that the machine handles combinations of addition, subtraction, multiplication, and division only.

Since the electronic brain requires considerable set-up time as well as the preparation of special IBM cards for each type of problem, its usefulness is confined to intricate solutions required in large quantities and largely for repetitive operations. In this respect the electronic brain is akin to special purpose machine tools and their economical use in mass production.

Although the IBM calculator has been in use at Buick for but a brief time it is already employed for the analysis and solution of a dozen or more major kinds of scheduling problems. In time its application will be extended to numerous other tasks, particularly those now requiring considerable manual calculation,

Electronic Brain

Schedules Parts Production Seven Weeks in Advance

detailed recordings and other paper work.

To illustrate the possibilities of such equipment in motor car plants and large parts plants, as well as warehouses, just two typical examples of what the brain does at Buick have been selected.

The first of these is the "Explosion Work Card," Fig. 1. This has to do with the usual exploded views of unit assemblies going into an automobile, showing the relationship of all parts entering into an assembly or sub-assembly. Cards are punched for each part, for all models, giving the following basic identification at the top of the card: Part number; assembly part number; raw material code; unit weight.

The body of the card then covers the following items which are suitably punched: Sequence code; part number; assembly part number; quantity per assembly; raw material code; unit weight.

This type of formula is used in analyzing the requirements of individual parts for car production, as well as for scheduling raw materials required for the purpose. When the final calculations have been made the information is used in scheduling parts production in the Buick plant for a period of seven weeks in advance of car assembly.

In preparation for a punch card run the calculator must be set up, the same as a machine must be tooled and jigged. This is done by plugging in the proper circuits for the range of operations required for the specific formula. Given the basic information on the punch card, in this instance the sequence code which specifies the circuit arrangement, part number, number of pieces per assembly, and unit weight, the computer will multiply to give the total quantity required for the number of assemblies specified for the period, and will also extend the total weight involved.

Since the same part number may be used in similar assemblies or sub-assemblies for a number of different models, in such cases the computer will also give the grand total of pieces and weight by collecting the pertinent data from out of the mass of cards being fed through.

Now consider an entirely different type of formula indicative of the capacity of the computer. It is common knowledge that Buick cars are assembled not only at the home plant in Flint but in a number of B-O-P

(*Turn to page* 86, *please*)

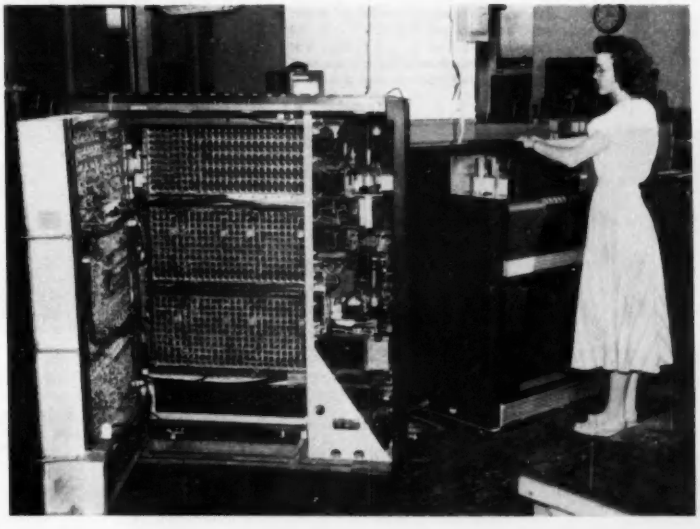


Fig. 3. View of the IBM electronic computor, the brain unit containing some 1400 electronic tubes being opened to show the maze of circuits. The cabinet at the right is the business end where IBM cards pour out at the rate of some 6000 an hour.

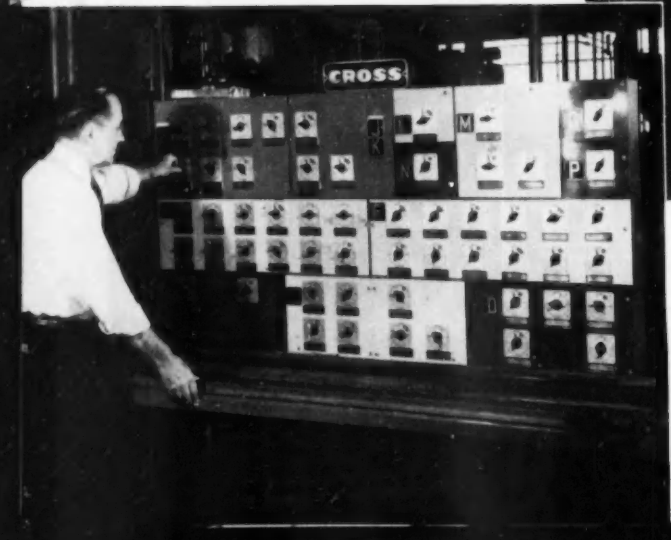
Special Equipment *Used to Build*

PART ONE Operations on the Case and Its Extension together with Assembly and Test Procedures Are Described in This Article. Part Two, Which Will Appear in an Early Issue of AUTOMOTIVE INDUSTRIES, Will Be Devoted to Production of the Torque Converter Section of the Unit at the Long Manufacturing Division of Borg-Warner Corp.

THE Seven Mile Road plant of Detroit Gear Div., Borg-Warner Corp., is running full blast on the production of automatic transmissions for Studebaker. Design details of this unit were revealed in AUTOMOTIVE INDUSTRIES, Dec. 15, 1949.

This plant is a new operation in every respect, representing the essence of modernity in production equipment, materials handling, and production flow. Among its prize exhibits are two of the latest type transfer machines to be found in the industry —an impressive arrangement of horizontal two-way Baush units for the transmission case, and a unique self-contained and compact unit produced by Cross for machining the case extension. Among the other interesting items of equipment in this plant are: Heald Bore-Matics; Davis and Thompson rotary mills; Buhr multiple-spindle, multi-head machines; a Bullard Contin-U-Matic; and a variety of other machine tools of familiar makes and types.

Transmission assembly is concentrated within a completely enclosed area which will be fully air con-



Possibly one of the first production installations of the Cross Tool-O-Meter serves the Cross Transfer-Matic Each of the dials on the board controls a set of tools and is calibrated in terms of number of pieces to be produced. The dials are connected into the electrical system of the machine in such fashion that the entire machine is stopped automatically as soon as one group of tools reports the completion of a cycle.

A view of part of the enclosed transmission assembly department with the final assembly conveyor in the foreground.

Studebaker's Automatic Transmission

By Joseph Geschelin

ditioned by the time this article is in print. Monorail conveyor lines traverse the various machine shop bays and are arranged to transport finished parts into the assembly room, delivering them to the proper assembly station.

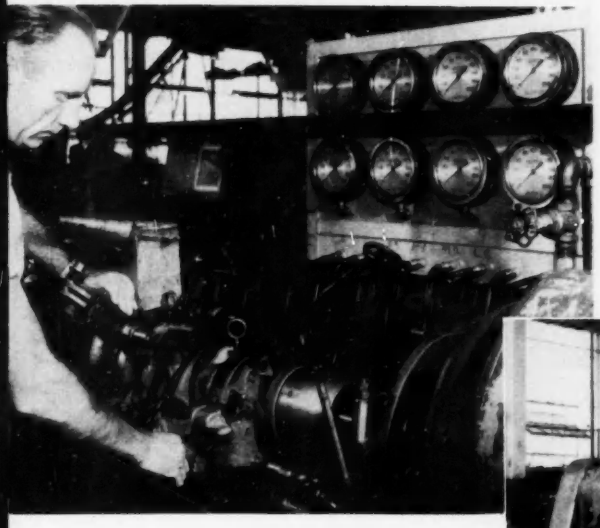
Because of the complexity of parts and sub-assemblies of an automatic transmission, unusual attention has been paid to precision operations and the attendant insistance upon close tolerances and fine surface finish.

Worthy of attention too is one of the first installations of the Cross Tool-O-Matic panel serving the Cross Transfer-Matic machine. The useful life of the variety of cutting tools at every station is prescribed by the setting of the various timing dials, subject to an automatic control which shuts down the entire machine whenever a group of tools requires replacement. This control assures maximum tool performance and is said to reduce down time materially.

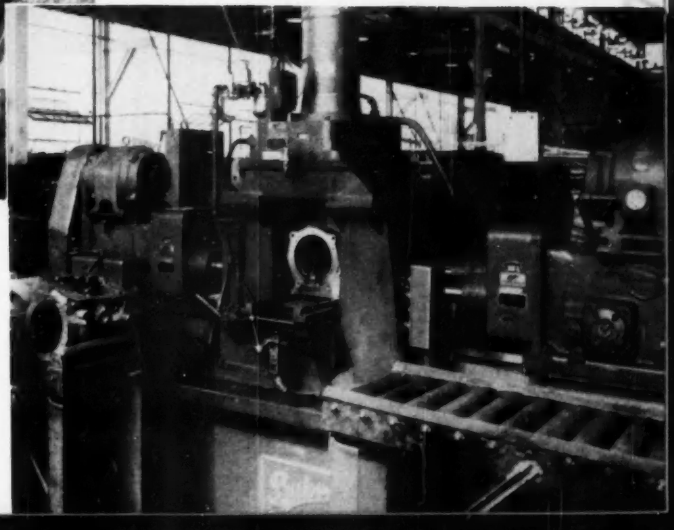
Since the transfer machines and related operations fairly dominate the scene this article will be confined to a picture of operations on the case and extension with some comment on assembly details.

The transmission case is a relatively complex cast iron housing requiring an extensive sequence of operations which, in this instance, has been arranged in automatic stages to simplify and organize the entire operation with the minimum of operator attention. Quality control starts with the foundry where critical mounting pads are held accurately and targeted prior to machining. This provides the locators for the first operation—milling of the bottom face in an eight-station 2A Davis and Thompson continuous rotary mill.

Having established the bottom face, the next operation is the drilling, reaming, countersinking, and facing of 67 holes in the bottom and top faces of the case in a Baush two-way, five-station horizontal drilling machine. The arrangement of heads and stations is as follows: (*Turn to next page*)



Closeup of one of the transmission final test machines. The operator puts each drive through all its paces, noting readings on the dial gages as well as observing the behavior of the drive in each phase of operation.



Closeup of the special Buhr three-way machine for boring, facing, and ring grooving of the case.

Station	RH Head		LH Head
1		Load	
2	17 holes		3 holes
3	10 holes		3 holes
4	11 holes		3 holes
5	17 holes		3 holes

Front and rear faces then are rough- and semi-finish-milled in another eight-station Davis and Thompson rotary mill. Some impression of the nature of the tolerances held in this operation may be gained from the fact that the front face is held to 2.516-2.518 in. from a key dowel hole, while the overall dimension is held to 10.032-10.037 in. Then the side faces are rough- and finish-milled in the third Davis and Thompson mill.

Following these preparatory steps, the case enters the Baush transfer machine which is arranged in two separate sections with a Baush index type drilling machine between. The first Baush unit is of eight-station type tooled for drilling, countersinking, chamfering, spotfacing, and tapping holes in front and faces. The number of holes at each station is as follows:

Station	RH Head		LH Head
6	1	Load	1
7	5		7
8	8		5
9	8		7
10	7		6
11	2		Idle
		Unload	

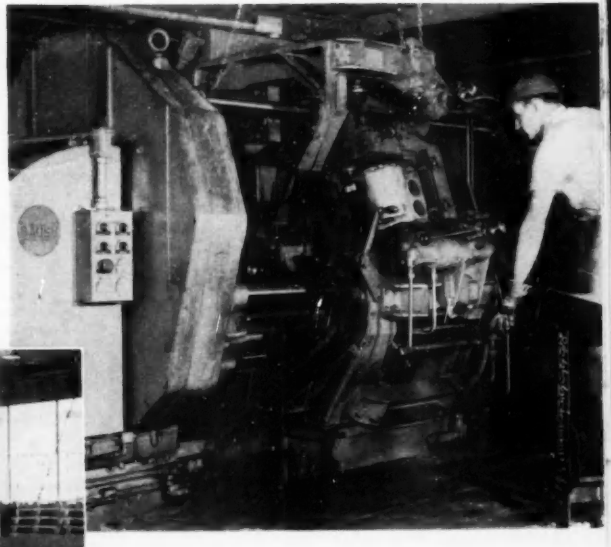
Cases are transported from the unloading station to the Baush six-station, index type drilling machine having five heads for drilling a group of eight angular holes in the bottom face.

The second section of the Baush transfer machine also is of two-way, horizontal unit type. It is composed of 13 stations, including loading and unloading, and accounts for 94 holes in the sides and bottom face. Specifically, it drills, bores, reams, countersinks, and taps holes in the side faces, and taps holes in the bottom face. In the following sequence of operations, the first eight working stations complete the work on the side faces. At the ninth station the case is rolled automatically 90 deg to present the bottom face for tapping.

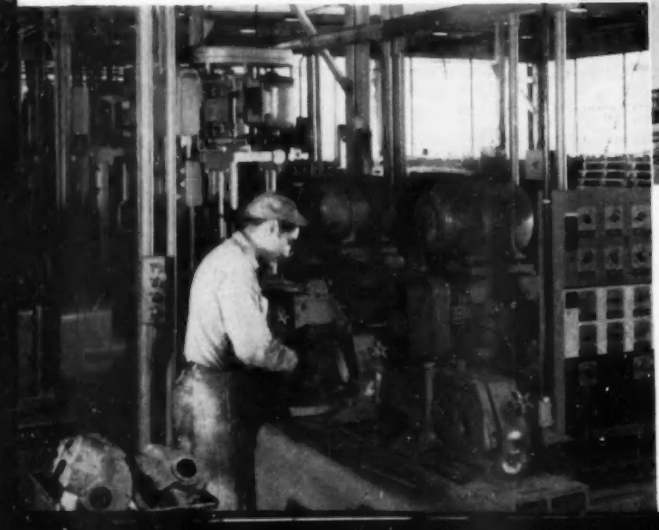
Station	RH Head	LH Head
18	2	2
19	2	1
20	6	4
21	6	2
22	5	8
23	6	9
24	3	4
25	5	6
26	(Roll over 90 deg to tap bottom face)	
27	14	
28	9	

Special Equipment Used to Build

An interesting example of the application of a Buhr special machine is the three-way boring, facing, and ring grooving unit illustrated here. The rear head faces the rear face and chamfers inside the rear face on the principal axis of the case, while the side heads machine grooves in the side bores.



The transmission case extension is finished, in the main, in the compact Cross Transfer-Matic unit illustrated here. The machine is composed of 12 stations, handles a total of 78 holes. Major feature is an automatic conveyor which carries 14 pallet fixtures from station to station. As shown at the loading station at the extreme right, each fixture is of two-station type, holds the extensions in two positions.



First major operation on transmission cases is performed in this Baush two-way, five-station horizontal drilling machine. It drills, reams, and countersinks some 67 holes in the top and bottom faces.

Studebaker's Automatic Transmission

This is followed by two settings in 46-B double-end, Heald Bore-Matics. The first of these does the precision-boring, facing, and chamfering of the main line bores. The second handles the precision-boring of three bores, holding to a diameter of 3.249-3.251 in.

Final operation on the case is done in a 14-in. Type RD three-spindle, Bullard Continu-U-Matic lathe where the case is located vertically on the bores of the principal axis for finish-turning the front and rear faces—flat and square with the axis. Squareness is held to 0.002 in. total indicator reading; while overall length is maintained to 9.998-10.002 in.

The case extension is a smaller part, handled in a smaller compass, and is finished, in the main, in the compact Cross Transfer-Matic machine to be described. Although small in size, the extension involves a considerable amount of precision boring work accomplished in a series of operations in four different Heald Bore-Matics.

The part is prepared for machining by grinding the large face flat within 0.003 in. total indicator reading in a three-wheel surface grinder. The part is located against three square bosses and held on three jogging points.

Machining in the Cross unit—drilling, reaming counterboring, countersinking, and tapping for a total of 78 holes—is done in unique fashion. The Cross machine has a total of 12 stations, including loading and unloading, and is provided with 14 pallet fixtures, shuttled from station to station on the automatic conveyor. Each fixture is of two-position type, designed to hold parts in two principal positions. To start the cycle, work is placed in the fixture for operations on the large ground face first. As the cycle is completed and the fixture returns to the loading station, the part is removed and fed to an adjacent Cincinnati 3 by 24 in. Duplex mill to semi-finish mill the sides. The carbide cutters in this mill are operated at 450 rpm, at 470 sfm, and with 18 in. per minute feed of the table.

Upon completion of the milling operation the work is placed in the second station of the fixture for drilling operations on the side. It can be appreciated that once the cycle is established, each fixture carries two parts, one of which is removed at the unloading station as a finished piece for each cycle of the machine. Thus the machine can be properly termed as being of double-cycle type.

The number of operations in the machine, including both fixture stations in the tally, is as follows:

Station	Vertical Head	RH head	LH Head
1		Load	
2	1	6	5
3		9	5
4	1	10	
5	1	7	
6		6	
7	1	4	
8	1	3	1
9		2	3
10		4	4
		1 angular	
11		3	

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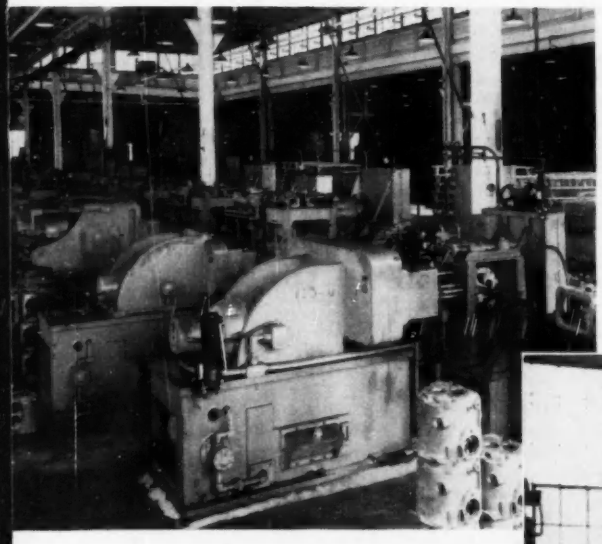
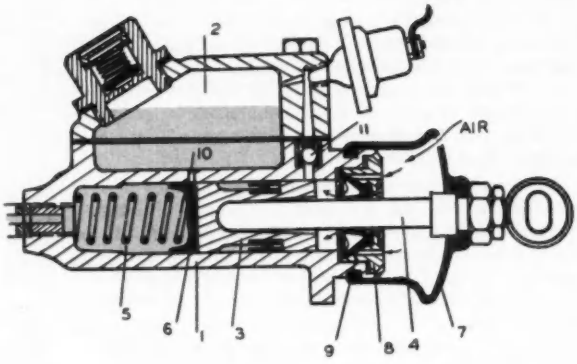


Milling of the various faces of the transmission case is done in a series of three Davis and Thompson Rota-Matic mills. The first operation is milling of the bottom face, as illustrated, in the eight-station continuous rotary mill.

Following initial milling and drilling cases enter the enormous Baush transfer machne, composed of two independent sections with a Baush index type horizontal drilling machine between. The first section consists of eight stations, the second of 13 stations. This view is a perspective of part of this extensive installation.

All Fluid in New Brake System Under Constant Pressure



This sectional drawing shows the master cylinder at the beginning of brake application. 1—master cylinder, 2—reservoir, 3—piston, 4—piston rod, 5—spring, 6—piston cup, 7—rubber boot, 8—rear plug, 9—seal, 10—passage between reservoir and master cylinder, 11—ball check valve.

FARINA hydraulic brakes, adopted as standard by Alfa Romeo and Lancia, feature a closed system in which a constant pressure of about 14 psi is maintained throughout, including the master cylinder reservoir. This pressure assures a full supply of liquid throughout the circuit and immediately compensates in any drop in pressure which may be caused by contraction of the liquid on cooling. As the system is constantly full and the fluid is practically incompressible, there is no lost motion at the pedal.

The master cylinder and the reservoir are separate castings with an oil-tight seal between them. On depressing the brake pedal the piston cup (6) closes the passage (10) between the master cylinder (1) and the reservoir (2) and creates a pressure which is communicated to the wheel cylinders. A vacuum is created behind the piston causing air to flow in through holes in the molded rubber boot (7) and past the seal (9). At the end of the stroke the hole (10) in the reservoir registers with a circular groove in the piston for lubrication purposes. A rubber ring on the piston provides a

(*Turn to page 72, please*)

Automobile Industry Hailed for Pioneering Mechanization

TRIBUTE is paid to the automobile industry for its pioneering leadership in widespread adaptation of conveying equipment to facilitate mass production in a sound-strip film to be released by the Conveyor Equipment Manufacturers Association about Oct. 1. Depicting ancient and modern conveyor equipment, the film cites the automobile industry as the best example of job creation by mechanization.

"Back in 1899 when work was done by hand, there were only 2000 production workers employed in the industry," according to the film. "As machines were installed so that more cars could be made at lower prices within the reach of more people, employment rose steadily until today 757,000 production workers are employed directly in building automobiles."

Indirect creation of employment and improvement in living standards are also illustrated. The film entitled, "Yours to Command," shows how modern equipment for handling materials offers major possibilities for cost reduction in industry today.

R. C. Sollenberger, executive vice president of the Conveyor Equipment Manufacturers Association, estimates that material handling accounts for more than 30 per cent of all manufacturing costs. He says that it is not uncommon for systematic modernization to cut these costs in half.

The 24-minute sound-strip film is designed for popular education in the American mass production principle as well as to serve as a sales medium for the conveyor industry. Copies are available from the Conveyor Equipment Manufacturers Association, 1129 Vermont Avenue, Washington 5, D. C.

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FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58

M-18—Vertical Die and Surface Grinder

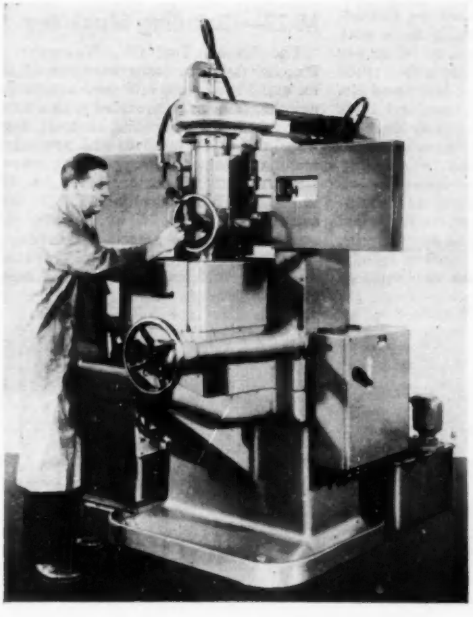
Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has designed a new vertical die and surface grinder for facing new die blocks, reconditioning dulled impression edges, and preparing worn dies for resinking, as well as being suitable for regular surface grinding. The machine is built in two sizes with table capacities 16 in. by 24 in. and 36 in. by 42 in.

Operating like a vertical profiler, it finishes flats around irregular reliefs, and is usable for precision step grinding. One and one-half to 2 micro inch surface finishes are produced without need for subsequent lapping or polishing and with minimum breaking-down of cutting edges. Clearance permits grinding between guide pins on blanking punch and die halves, thus eliminating much disassembly and reassembly time in resurfacing impression edges.

A hydraulically operated table reciprocates on a rigidly constructed bed. A cross rail, supported by two uprights to the bed, carries a vertical spindle which can be moved crossways by a sensitive control handwheel. The 16 in. by 24 in. machine accommodates 3 in. and 5 in. diam cup wheels, and 10 in. diam ring wheels are used on the 36 in. by 42 in. machine. A constant flood of coolant is supplied through the center of the spindle to the inside of the wheel and through an auxiliary line to the outside of the wheel. Guards enclosing the table and adjustable guards and circular brushes for each size wheel control the spray thrown by the wheel.

The 16 in. by 24 in. die and surface grinder has three spindle speed changes which adapts the machine for grinding carbide or tough die steels. The speeds are suited for 3 in. and 5 in. diam grit cup wheels and diamond cup wheels. The table hydraulic drive has a variable feed range from 1 to 20 ft per min.

The 36 in. by 42 in. vertical die and surface grinder accommodates the larger sizes blanking punch and die and forging dies. A 10 in. ring wheel is used on this machine with a spindle speed of 1750 rpm. Table hydraulic power feeds range 1 to 40 ft per min.



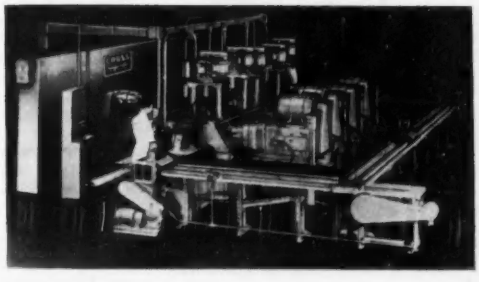
Pratt & Whitney vertical die and surface grinder for surfacing high speed steel and carbide dies

M-19—Special Machine for Transmission Extensions

The most recent special machine which Cross Co. of Detroit, Mich., has built, to keep pace with the recent trend to automatic transmissions, is one which drills, bores, and taps automatic transmission extensions.

This Transfer-matic—the Cross name for its machine tools equipped with automatic transfer mechanisms — finishes 85 pieces at 100 per cent efficiency with only two operators. It has 12 stations, including one for loading, ten for cutting, and one for unloading. Two-position progressive type, pallatized work-holding fixtures are used. These carriers are automatically returned from the unloading to the loading station on an integral conveyor.

The machine is equipped with Toolometers — a new device recently announced by Cross to control tool life and automatically stop the machine when tools need resharpening. This feature, together with pre-set tools, which speed tool changing and elimi-



Cross special machine for drilling, boring and tapping automatic transmission extensions

nate machine adjustment, results in less down time and greater production.

Other features include hydraulic feed, rapid traverse, the use of standard Cross sub-assemblies to facilitate maintenance, reduce down time, and provide some flexibility for part design changes.

M-20—Press With Extra Long Stroke

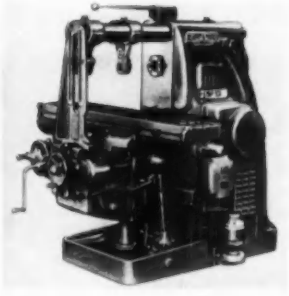
To meet a need among die casting and other manufacturers for a press with extra long stroke, extra shut

height and extra throat depth, the Federal Press Co., Elkhart, Ind., has made an addition to its line of presses with their No. 44, of 35-ton capacity, having standard stroke of 6 in. and standard shut height of 10 in. Any stroke from 1 in. to 12 in. is available; frame extension or added shut height from 1 in. to 10 in. over standard is available. Throat depth is 11½ in.

The new unit includes a removable ball seat, round-type ram clamp, and a rear-operated reclining mechanism. It offers Timken bearings, non-repeat clutch (standard or multi-pin) mechanism, and time-saving knockout bracket. The No. 44 has a 33 in by 21 in. bed area and a 24 in. (r to l) by 8 in. (f to b) ram face.

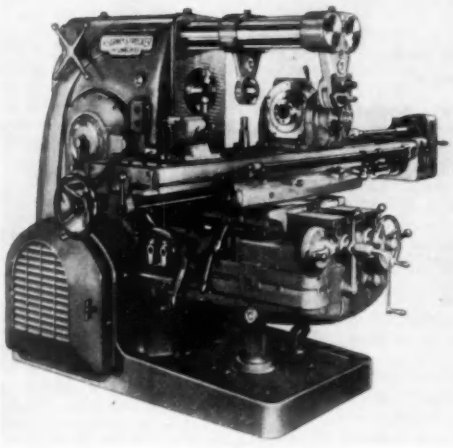
M-21—Knee Type Milling Machines

Designated as Model CK, a new line of general purpose knee type milling machines, in plain and universal styles, has been announced by Kearney & Trecker Corp., Milwaukee, Wis. Offered in five sizes—No. 2, 3, 4, 5 and 6—features include newly designed columns, heavier by 1000 to 1200 lbs; spindle mounted flywheel, running with three-bearing support; heavy duty 2 in. diam table feed screw, extra long bronze nut, and positive backlash eliminator.



Kearney & Trecker plain knee type milling machine

Increased hp ratings are provided, coupled with independent motor drives for spindle and for feed and rapid traverse. Spindle and feed motors are interlocked with positive automatic safety control for overload conditions, preventing cutters from stalling in the cut. Spindle hp ratings of these milling machines, according to size, are 10 hp No. 2, 15 hp No. 3, and 25 hp Nos. 4, 5 and 6. A double duty spindle nose on Nos. 4, 5 and 6 size machines is an innovation. In addition to the conventional No. 50 National Standard spindle nose, a No. 60 heavy duty driving flange has been integrally forged with it to permit improved cutting efficiency when large diam face mills, or flange type arbors for large diam side and slot milling cutters are used.



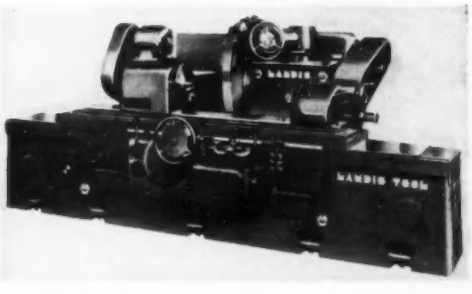
Kearney & Trecker universal knee type milling machine

A Mono-Lever control facility for table feed, and rapid traverse is provided. Feeds and speeds take full advantage of modern cutting tools with feed changes from ⅜ in. to 90 in. per min. There are 24 spindle speed changes. Speed range on No. 2 and No. 3 machine is 15 to 1500 rpm, and 13 to 1300 on Nos. 4, 5 and 6. Gear clashing in changing speeds is eliminated by an automatic protecto-mesh controlling system.

Universal style machines are equipped with a hypoid type universal spiral dividing head. This head has a quick indexing ratio of 5:1 between spindle and handcrank. Another modern feature is the non-sticking taper No. 50 national standard spindle, conforming to the machine spindle, with which standard milling machine tools can be used interchangeably.

M-22—Grinding Machines

The Landis Tool Co., Waynesboro, Pa., has brought out a new line of 10 in. and 14 in. plain and semi-automatic grinding machines provided with a new heavy bed, new operating controls, new way lubrication methods and new telescoping covers for the carriage ways. Lengths between centers of 18 in., 36 in., 48 in., 72 in., 96 in. and 120 in. are available in both 10 in. and 14 in. swings. This size precision grinder is for medium weight work pieces that must be cylindrically ground to a high

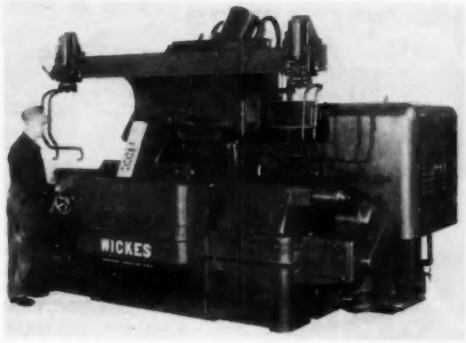


Landis 10 in. and 14 in. plain and semi-automatic grinding machines

For additional information please use coupon on page 58

M-23—Center Drive Crankshaft Lathe

Wickes Brothers, Saginaw, Mich., is announcing their Model CF-4 automatic rough and finish turning center drive crankshaft lathe which is designed for



Wickes rough and finish turning center drive crankshaft lathe, Model CF-4

degree of finish and accuracy. It handles small lot jobs as well as those for steady high production, accommodating straight cylindrical, taper, shoulder, and with extra equipment, profile and angular grinding.

A 30 in. diam grinding wheel is standard, driven from either a 10 or 15 hp motor. Headstock is powered by a 1 hp motor, with 4 work speeds from 54 to 150 rpm. Both the wheel drive and complete headstock drive are through vee belts.

Microsphere bearings support the grinding wheel spindle. They are babbitt lined, steel backed, one-piece bearings, adjustable for clearance between spindle and bearing. Running clearance between spindle and bearing is less than with conventional sleeve or cap bearings.

Headstock spindles, wheel feed and hand traverse all use anti-friction bearings. The wheel feed hand wheel can be operated as a coarse feed or fine feed. A hydraulically operated slow grinding feed for traverse grinding operations feeds at each or either reversal point. Rapid hydraulic infeed operates in conjunction with either a traverse grinding feed or a plunge grinding feed. For semi-automatic plunge grinding operations a timer may be supplied. Operator then need only load and unload the work pieces.

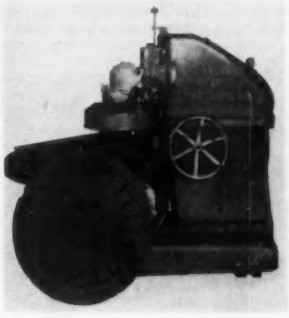
Telescoping covers are provided to protect the hand scraped carriage ways. A swivel table permits grinding of tapered work. Traverse speeds range from 3 ipm to 240 ipm. The traverse is hydraulically operated by a twin cylinder system.

The electrical installation is provided with oil and water proof push buttons. Electrical controls are mounted in a dust and also moisture tight cabinet. rough and finishing turning of all crankshaft main line bearings and ends simultaneously. Three sets of cross slides surround the crankshaft with cutting tools. Front and rear cross slides carry the rough turning tools and divide the tool load on the crankshaft during the cheeking, rough turning and filleting operation. A third massive slide which extends from spindle to spindle approaches the crankshaft from the top with finishing tools following a few thousandths behind the rough turning tools. When the roughing tools have reached their diameter, they slowly withdraw while the finishing tools continue their spacing operation and then proceed to finish turn and fillet the bearings.

The Wickes Model CF-4 crankshaft lathe is furnished with a hydraulically operated tailstock, live centers and an electric power operated chuck controlled entirely by a push button on the control panel. The operator needs only to load the crankshaft and press a button on the control panel to start the machine in automatic cycle.

Production depends on the type of crankshaft and stock to be removed. On one leading automotive crankshaft, it is reported, the production obtained from two of the older style crankshaft lathes with one operator was 24 crankshafts per hr for rough turning only. Production of the same crankshaft on two new Wickes Model CF-4 lathes with one operator, is stated to be 35 crankshafts per hr for rough turning, and also finishing turning.

M-24—Table Core Grinder



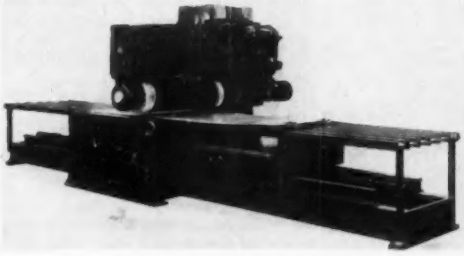
Standard 48 in. diameter table core grinder

A new 48 in. diameter table core grinder designed by Standard Pattern Works, Detroit, Mich., for eliminating the hand rubbing of cores, is mounted on large precision roller bearings, and

(*Turn to page 62, please*)

M-25—Openside Oscillating Type Sheet Buffing Machine

Brought out by the Hill Acme Co., Cleveland, Ohio, is their new 48 in. wide openside oscillating type sheet buffing machine, with hydraulic table and power elevating and lowering head for 18 in. diam buff roll or Tampico brush roll. This "Hill" buffing machine is recommended for heavy-duty protection finishing of ferrous and non ferrous sheets. The oscillating mechanism is powered by a 5 hp motor and has a stroke variation from ½ in. to 2 in., and a range of 50 to 150 cycles per min. The main spindle is powered by a 50 hp to 100 hp main drive motor. The machine is built in table widths up to 72 in. and table lengths of 8 ft. and over.

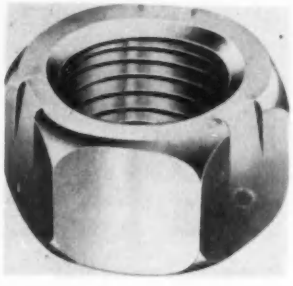


NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 58

P-24—Self-Locking Nuts

"Lokuts" has been selected as the new trade name for the line of prevailing torque type self-locking nuts manufactured by Illinois Tool Works, Chicago, Ill. Distributed by the Shakeproof, Inc., division of the company, the nuts are manufactured under exclusive license from the Boots Aircraft Nut Corp., Stamford, Conn., and were



Illinois prevailing torque type self-locking nuts called "Lokuts"

formerly sold under the trade name, Tri-Lok. These "Lokuts," available in a broad range of standard nut sizes, are said to provide extremely effective resistance to vibration loosening. Because they incorporate the prevailing torque locking principle, they lock at any position on a bolt and are claimed ideal for spacing and spring compressing applications.

Other Shakeproof fastenings include Shakeproof toothed lock washers, Sems (pre-assembled screws and Shakeproof lock washers), thread cutting screws and "Speed Nuts."

P-25—Passenger Car White Wall Tire

Called the Fisk Safti-Flight, a new Custom-Quality tire for passenger cars announced by the Fisk Tire Division of the United States Rubber Co., Detroit, Mich., is built specifically to prevent blowouts and skidding. Tread design includes multiple safety slotting for quicker stopping and sure-footed control at highway speeds. The safety slots are scientifically spaced to eliminate pitch noises while the new groove shape keeps stones out of the tread. The design provides more than 3000 safety slots across the tread face and up to 64 sharp rib edges around the tread face. Sharp slot edges projecting from the tread break up road film and sweep it aside for faster, straighter stopping power. The deeper tread design features a compact footprint for placing more rubber on the road. Cushioned riding quality is assured by a low pressure casing.

U. S. Rubber Custom-Quality White Wall tire, the Fisk Safti-Flight

The terraced side wall is said to represent a departure in tire designs. A defender scuff guard, a protective rib, makes white walls practical and keeps them attractive by blocking blows from curb or rut.

P-26—Heavy-Duty Mufflers

Introduced by Donaldson Co., Inc., St. Paul, Minn., a new line of heavy-duty mufflers is said to reduce exhaust noise to a low level without objectionable back pressure, and to be well within the acceptable range permitted by engine manufacturers.

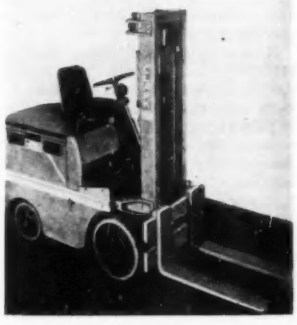
It is claimed that the new mufflers reduce smoke and fumes, lessen valve pounding, improve volumetric efficiency of the engines, decrease fuel consumption, lower muffler jacket temperatures and reduce cab panel drumming and vibration.

To inhibit corrosion the mufflers are made of aluminized sheet throughout. Two types are available—a vertical cab-mount muffler, and an oval type for under-chassis installations. Both are designed for gasoline and Diesel engines in the 150 to 300 hp range.

P-27—Fork-Lift Truck

Reduced over-all width and increased speed feature the new 3000-lb-capacity electric Carloader fork-lift truck put out by the Clark Equipment Co., Battle Creek, Mich. Automatic acceleration provides smooth and even variations of motor speed, accomplished through a master power-switch regulated by an automatic timer.

The steering-column directional control lever engages the first point of power for either forward or reverse operation. Controls are the non-plugging type which prohibit change in the direction of travel until the motor comes to a full stop.



Clark 3000 lb capacity electric Carloader fork truck

Absolute safety is said to be insured by simultaneous action of the directional control-lever lock and a "deadman" brake. The lever locks in neutral, and the brake, operating off the driveshaft, sets automatically when the driver leaves his seat.

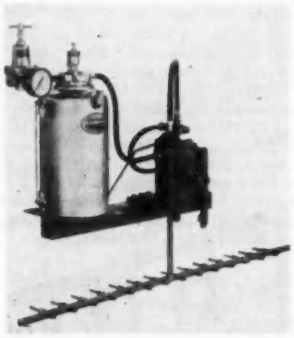
A separate motor powers the hydraulic pump, and provides lifting and tilting power and speed. A newly-designed lift-control lever operates in the direction of required action.

Lift heights are available in a range

from the standard 84 in. with over-all height of 61 in. with forks down, to 130 in. and an over-all height of 84 in. with forks down. Hi-Lo-Stack uprights are optional. Load center is 24-in.

P-28—Automatic Conveyor Lubricator

An automatic conveyor lubricator with multiple outlets for oiling chain-link-pins and trolley wheels has been



Fauver automatic conveyor lubricator

designed and built by J. N. Fauver Co., Inc., Detroit, Mich., for one of the largest automobile manufacturers. The manifold has fourteen outlets, 2⅝ in. apart to lubricate the chain-link-pins that are relatively closely placed. The trolley wheels are also lubricated by nozzles attached to the tripping mechanism and directed straight downward. The trolleys run on an I beam, and are spaced 37 in. apart. The oil is directed at the point where the wheels rotate against the hub at the end of the wheel pin bearings, necessary since there are no fittings on this particular conveyor. Oil reservoir consists of a two gallon container, equipped with air regulator and pressure gages. Speed of the conveyor is fourteen to twenty fpm.

P-29—Sockets With Carboloy Inserts

With the cooperation of the Carboloy Co., Inc., J. H. Williams & Co. of Buffalo, N. Y., has developed a new line of Impact "Supersockets" for driving case-hardened, self-tapping screws with power tools of all types. They may also be used with hand drivers.

Due to the hard case found on screws of the self-tapping type, it is pointed out, even the best alloy steels, properly hardened, do not offer sufficient life. The screw drive opening in these new Impact "Supersockets" (first of their kind in industry) is formed of solid "Carboloy" which is permanently inserted into a hardened steel blank. Actual life due to the "Carboloy" surfaces which drive the screw is reported to be at least ten times that of all-steel sockets.

Two sockets are now available in ¼ in. square drive with ¼ in. and 5/16 in. nominal hexagon openings. Both sockets fit hex, hex washer and oval hex washer heads. Finish is satin nickel.

P-30—Visual Thread Comparator

Hanson-Whitney visual thread comparator

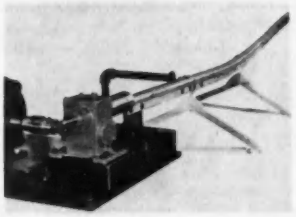
The Hanson-Whitney Co., Hartford, Conn., offers a precision instrument for inspection and production gaging of external threads, said to have been tested since 1945 in checking all forms of threads, including critical air craft threads.

The indicator of the instrument tells at a glance whether the product is oversize, undersize, eccentric, tapered, or if lead error exists. Because the work is recorded visually to accepted ring gage tolerance, the human error possibility of "feel" is eliminated.

Its capacity covers external threads from 0 through 3¼ in. diam, coarse or fine pitches in all classes. Class 5 is furnished on specific request. Simplicity of design and action permits checking of up to 20 pieces per min, with 3 min required to change thread diameter units.

Upper anvil is easily positioned in relation to the lower (stationary) anvil (actually a split internal thread member) by insertion of the setting plug and tightening of the indicator lock-screw. The indicator is equipped with tolerance bands and is graduated in tenths of thousands to check within 0.0002 accuracy.

P-31—Light Duty Screw Conveyor



A simple, low-cost flexible screw type cable revolving within a metal rail, developed by Teleflex, Inc., Philadelphia, Pa., can carry light loads up to 15 lbs per ft around bends and through rise or fall. Items to be transported are suspended from hooks or propelled along rail on bench fixtures by screw action of the revolving cable. A ½-hp drive unit is generally recommended to attain a maximum speed of 12 fpm. A closed circuit is unnecessary.

P-32—Turret Punch Press

The Diamond Machine Tool Co. of Los Angeles, Calif., announces a new improved hand operated turret punch press for piercing, embossing or forming parts in quantities of less than 500. There are no dies to make and no dies to set. The press has 13 in. throat and contains 12 punches and dies, any of which may be brought under the ram for immediate use by a twirl of the index handle. Capacity is 10 ton and maximum punch size is 1⅛ in. with ⅛ in. mild steel. Anti-backlash gearing of turrets keeps punches in permanent precision alignment. A special punch developed for this machine permits the piercing of steel up to twice the punch diameter within the machine capacity.

Diamond hand operated turret punch press

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-27 Stud Welding

Nelson Stud Welding Div., Morton Gregory Corp.—A 16-page illustrated booklet reprinting the chapter on "Stud Welding" from the third edition of the Welding Handbook, published by the American Welding Society is available. The article explains the stud welding method of fastening, describes the equipment and its principal uses, and gives stud locating procedures and other data.

L-28 Engineered Bronzes

Federated Metals Div., American Smelting and Refining Co. — A new pamphlet on Herculoy for general purposes and gear bronzes is available. Suggestions for typical applications are enumerated in the bulletin. There are also tabulations of physical properties for the two types of copper-silicon alloys.

L-29 Filters

Micro Metallic Corp. — An 8-page booklet on SMX filters lists the advantages, uses, operation and manufacturing methods of the filters. Properties are listed, water flow and air flow of these porous stainless steel filters, types of filters and their arrangements for various requirements and detailed engineering information on dimensions and specifications. Special features are discussed and a detailed description of high pressure filters and SXM and GTN filters with filter aids.

L-30 D-C Motors

Reliance Electric and Engineering Co.—A 12-page illustrated bulletin discusses construction, design, selection and ordering information. Special attention is given in the booklet to the mechanical features and electrical characteristics.

L-31 Tank-Trailers

Fruehauf Trailer Co. — Announcement has been made of the publication of a new tank-trailer catalog. It is well illustrated, gives specifications of all standard tank-trailers plus information on equipment for specialized liquid hauling jobs. Illustrations in the catalog show step-by-step construction of these units in the company's plants.

L-32 Housing-Type Presses

Lake Erie Engineering Corp.—A new series of bulletins covering the company's complete line of side housing type hydraulic metal working presses has been announced. Bulletin 2.1 in the series covers design features such as press structure, hydraulic system, cushions, electrical circuits and controls and operation. Bulletin 3.1 presents the single action models and illustrates the many types and sizes available as well as their applications. Bulletin 4.1 covers both double and triple action models and illustrates the various types and sizes and their applications.

L-33 Cylindrical Grinding Wheels

Simonds Abrasive Co.—A new 4-page catalog bulletin, No. ESA-191, describes grinding wheels for plain cylindrical grinding, includes grain and grade recommendations specifically for their class of work and gives popular wheel sizes and data on speeds and feeds.

(*Turn to page 72, please*)

TIME SAVER COUPON

***THIS TIME SAVER COUPON** is for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above **OR** New Production and Plant Equipment **OR** New Products items described on other pages.*

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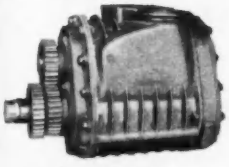
Schwitzer-Cummins SUPERCHARGERS

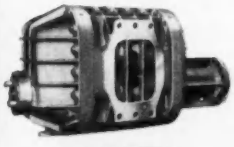
Pictured above—Unusual combination of Supercharger and Water Pump for six cylinder, two cycle Diesel with automotive engine type bearings, pressure lubricated from engine oil pump.

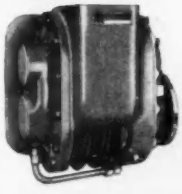
POSITIVE DISPLACEMENT . . . Sizes to Supercharge Engines 50 HP to 500 HP—Pressure Ratios 2 to 1 Maximum.

IMPROVE the performance of your Diesel engine with a Schwitzer-Cummins Supercharger—give it more horsepower—make it a better, smoother engine—put the power in it necessary for higher altitudes. Twenty-five years of intensive engineering, field experience and research go into the product we offer. You will find nothing better built.

Schwitzer-Cummins Superchargers return many advantages to the engine builder. When we take on an assignment to supercharge an engine, we do it with the confidence that we will deliver the very maximum of improvement in performance and at the lowest installed cost as well.







Inherent in the design of Schwitzer-Cummins Superchargers are many superior features. The distinctive two-lobe impeller accomplishes greater displacement from a smaller unit, and eliminates needless weight and cost. The unusual close manufacturing and operating tolerances possible, increase volumetric efficiency. The unit occupies little space, installs compactly, and inexpensively. Drives, often overlooked as to their importance to cost, can be simple, reliable, and save money. Due to the extensive volume of our supercharger production, we are well tooled on basic parts so that a new application or a new customer may escape much of the expense of initial tooling. This all adds up to superior performance with low installed cost.

We build superchargers for trucks, busses, bulldozers, shovels, power plants, submarines, in fact for all uses from 50 to 500 HP ratings. We are at it constantly—our production is large (approaching six thousand for one important company alone), so we can offer you the last word in design, unparalleled engineering assistance, and the ability to manufacture efficiently and at low cost.

SUPERCHARGER SPECIALISTS FOR OVER 25 YEARS

OTHER PRODUCTS

- OIL PUMPS
- WATER PUMPS
- COOLING FANS
- VIBRATION DAMPERS
- AUTOMATIC SHAFT SEALS

SCHWITZER-CUMMINS COMPANY
1125 MASSACHUSETTS AVENUE
INDIANAPOLIS 7, INDIANA, U.S.A.

New Army Vehicle

(*Continued from page* 33)

to the rear, the other to the front axle. From the standpoint of interchangeability, the unit not only has numerous parts interchangeable with parts of the driving axles but can be used in vehicles having either 6 x 6 or 4 x 4 drive.

In general, the M-34 incorporates features of simplicity of maintenance as well as parts interchangeability to a degree unattainable heretofore.

Let us consider first the special requirements. Engine specifications listed here show an increase in compression ratio to 6.73 to 1 for operation on 80-octane gasoline. The engine is fitted with a 24-volt, waterproof and radio-shielded electrical system including the following equipment: Delco-Remy 24-v, 25-amp sealed generator; D-R 24-v sealed starting motor; a special waterproofed D-R unit combining distributor and coil; a sealed D-R voltage-current regulator mounted on the dash; and a waterproofed D-R 23-plate, 100-amp hr capacity battery. Resistor type spark plugs with 10,000-ohm resistors are used in conjunction with weatherproofed wiring harness, including radio shielding.

The oil filter is a Fram Senior of military type while the air cleaner is a Donaldson Type 9E. The Holley downdraft type carburetor, Holley governor, and AC fuel pump complete the itemization of accessories. Fuel tank capacity is 50 gal.

As mentioned earlier, the vehicle carries an underwater kit, consisting of standpipes for the intake and exhaust systems. In addition, it is necessary to connect the air compressor inlet to the air cleaner by means of a supplementary hose. Further protection is provided by using a waterproof type breather on the oil filler.

Supplementing these devices, the vehicle is provided with a control valve on the instrument panel which is actuated before fording to shut off the normal crankcase breather and thus enable the engine to run with pressurized crankcase. This arrangement makes the engine completely waterproof.

So far as air temperature is concerned, all components of the engine except fan belts and oil seals will operate satisfactorily under the specified conditions. These belts and seals will function satisfactorily in the range of —40 to 125 F, however, a kit containing special fan belts and oil seals is required to take care of the range from —40 to —65 F.

It may be noted at this point that all parts of the vehicle are treated to prevent corrosion and fungus attack. It is of interest that both the muffler and tailpipe are fabricated of aluminized steel to resist corrosion.

Because of underwater fording requirements, running gear units are vented into a manifold system which is connected to the air cleaner. These include: axles, transmission and transfer case, brake master cylinder, brake booster cylinders, ignition distributor, fuel pump, and gas tank.

With respect to running gear units, the M-34 is equipped with a 12-in. Long clutch of dry disk, single plate type; a five-speed, direct in fifth, Spicer No. 3052 synchromesh transmission with power take-off opening on the left side; and the unique synchromesh Timken transfer case described earlier.

The front axle is a Timken FC-240-H-X1, while the rear axle tandem combination is a Timken-SFD-75-H-X2. All are of double reduction type.

Service brakes are "air-over-hydraulic" with a Bendix-Westinghouse 7¼ cu ft capacity air compressor and 1956 cu in. air reservoirs. The brake booster is a Midland 4½-in. Air Hy-Power assembly. The hand brake is the Timken Duo-Grip, mounted on the transfer case. Ross TA-66 cam- and twin-lever steering gear with a ratio of 23.4-19.5-23.4 to 1, is standard.

Semi-elliptic springs are employed front and rear. Direct, double-acting shock absorbers are mounted at the front suspension only.

Interchangeability of parts, particularly with respect to the three driving axles, has been carried out to an amazing degree through deliberate design planning. Some impression of what has been accomplished may be gained from a comparison of this vehicle with World War II vehicles of similar kind. The cost of spare parts per vehicle in World War II, represented about 15 per cent of vehicle cost. For the M-34 the cost has dropped to 10 per cent of vehicle cost. From the standpoint of bin storage the interchangeability program represents a saving of 1/3 in bin storage space.

As a further example of interchangeability, Reo points out that all frame cross members are stamped from the same die. Although they are not interchangeable in the strict sense of the term, owing to differences in drilling, they are basically the same stamping.

Coming to the details of the power drive, it is of interest that the new transfer case provides for a straight line through drive to the rear driving axles, thus reducing the angularity of propeller shafts. Moreover, increased ground clearance is obtained by the use of the top-mounted double-reduction final drive.

Axle interchangeability may be summarized as follows:

1—Rear axles are interchangeable as complete assemblies.

2—Rear axle housings are identical.

3—Final drive assemblies, interchangeable for all axles, including front.

4—Differential case halves identical.

5—Axle shafts are identical and interchangeable from side to side.

6—Hub and bearing cup assembly identical for all axles.

(*Turn to page* 62, *please*)

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Despite a moderate decline during the week ended July 1, general business activity continued on a level substantially above that of a year ago. Bituminous coal production, railway freight loadings, and electric power production were lower than in the preceding week, while department store sales, crude oil output, and construction increased. The *New York Times* index of activity for the week stands at 157.4, as compared with 161.2 in the preceding week and 133.4 a year ago.

Sales of department stores during the week ended July 8 (a holiday week), as reported by the Federal Reserve Board, were equal to 216 per cent of the 1935-39 average, as compared with 263 in the week before. At this level, the value of sales was seven per cent more than in the comparable week of last year. The total reported since the beginning of the year is one per cent below the corresponding sum in 1949.

Crude oil output in the week ended July 8 averaged 5,475,000 barrels daily, 40,150 more than in the preceding week and 753,900 above the production in the comparable period of last year.

Civil engineering construction volume reported for the five-day week ended July 13, according to *Engineering News-Record*, was $364,963,000, a new weekly record for peacetime. At this level, the volume of construction was 63 per cent above the average to date this year, while the total recorded since the beginning of the year is 46 per cent more than that in the similar period of 1949.

Production of bituminous coal and lignite during the week ended July 1 is estimated at 10,160,000 net tons, 462,000 less than the output in the week before but 8,860,000 above the corresponding amount in 1949.

Railway freight loadings during the week ended July 8 totaled 553,876 cars, 29.3 per cent less than the figure for the week before and seven per cent less than the comparable number recorded a year ago.

Electric power production decreased moderately during the week ended July 8. Total output was eight per cent above the amount a year earlier, as compared with an advance of 13 per cent shown in the preceding week.

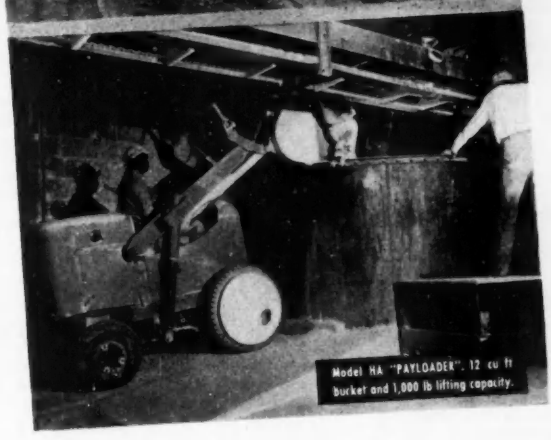
The wholesale price index of the Bureau of Labor Statistics during the week ended July 3, at 159 per cent of the 1926 average, was 1.2 per cent higher than in the preceding week and 3.9 per cent above the corresponding figure in 1949.

Member-bank reserve balances rose $194 million during the week ended July 12. Underlying changes thus reflected include declines of $193 million in Reserve bank credit, $146 million in money in circulation, and $262 million in Treasury deposits with Reserve banks.

Total loans and investments of reporting member banks declined $308 million during the week ended July 5. The increase of $58 million in commercial, industrial, and agricultural loans was more than offset by a substantial reduction in holdings of Government securities. Total business loans, at $13,660,000, were $664 million more than the comparable sum a year ago.

VICKERS HYDRAULICS *Help* HOUGH "PAYLOADERS" *LIVE UP TO THEIR NAME*

Model HM "PAYLOADER". 1½ cu yd bucket and 6,000 lb lifting capacity.


Model HA "PAYLOADER". 12 cu ft bucket and 1,000 lb lifting capacity.

Vickers Hydraulics help various models of the Hough "PAYLOADER" live up to their name . . . a name that means fast, low cost operation. Typical are Models HM and HA shown here; a Vickers Series V-200 Pump supplies hydraulic power. The big Model HM also has Vickers Hydraulic Power Steering.

The Vickers hydraulic equipment used on the Hough "PAYLOADERS" is representative of only one series of units built expressly for mobile and construction machinery service. For example, the new Vickers Balanced Vane Hydraulic Pumps, Series V-200, V-300 and V-400 offer the designers and manufacturers of this class of machinery a wide range of pump capacities . . . capacities of 2 to 54 gpm for hydraulic operating pressures up to 1500 psi.

Vickers Hydraulics have improved the performance of a wide variety of mobile equipment. It will pay you to look into the possibilities of using the best hydraulic pump value on your equipment. Get in touch with the Vickers office nearest you or write for further information.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

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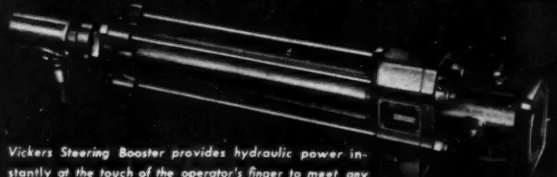
Vickers Hydraulic Power Steering is Effortless, Positive and Shockless


Vickers Steering Booster provides hydraulic power instantly at the touch of the operator's finger to meet any steering requirement for better maneuverability of loaders with heavy loads on steering axle.

This Series of Balanced Vane Type Pumps features automatically controlled radial and axial clearances that maintain high efficiency over a very long life.

7—Inner and outer bearing caps identical for all axles.

8—*On the bogies*—

(a)—Torque rods are interchangeable and reversible.

(b)—Upper and lower torque rod brackets are identical and removable.

(c)—Spring seat brackets are identical and removable.

(d)—Inner and outer spring seat bearings are identical on both sides and interchangeable with outer wheel bearing.

(e)—Spring seat bearing adjusting nuts are identical and interchangeable with wheel bearing adjusting nuts.

9—Brakes—as a complete assembly, identical and interchangeable side to side.

10—Brake wheel cylinders are identical and interchangeable side to side.

11—Brake drums are identical and interchangeable from side to side. Moreover, they are demountable without disturbing wheel bearing adjustment.

12—Pinion oil seals are identical in all axles and on transfer case shafts.

13—Wheel bearing seals are interchangeable for axles and bogie spring seats as well.

14—Inner and outer wheel bearing cones are identical for all axles.

15—Wheel bearing adjusting nuts are identical.

16—Universal joint flanges are interchangeable on all axles.

Studebaker Automatic Transmission

(*Continued from page* 51)

An interesting feature of the Cross machine is the automatic conveyor which transports the pallet fixtures from station to station, then transfers the fixture to a parallel conveyor line for the return to the loading station.

Both the Baush and Cross transfer machines are served by the tool racks developed recently by Cross. Each tool rack holds two sets of tooling for each machine together with the necessary gages for pre-setting the tools. Thus it is possible to make tool changes quickly and without recourse to adjustment within the machine.

One of the first installations of the Cross Tool-O-Meter control board—and the first to be observed by the writer—was installed recently to serve the Cross transfer machine. As illustrated, the board contains a series of dials calibrated in terms of number of pieces to be produced, as a measure of the useful life between grinds or dressings of each type of cutting tool used at the various stations. These dials are connected into the electrical system of the machine in such fashion that the entire machine is stopped automatically as soon as one group of tools reports that it has completed the prescribed cycle.

This principle opens the way to unlimited possibilities in tool development. For instance, Detroit Gear has initiated the project with somewhat arbitrary life expectancy data based upon past experience. From now on it will be feasible to develop information as to actual life expectancy with considerable economy in prospect. Experience will show whether the initial cycle should be increased or decreased for best results. Naturally there is considerable economy in cases where the life cycle can be increased. In any event this is a development of moment and well worth watching.

Final operations on the extension are performed on the group of Heald Bore-Matics mentioned earlier. Among these are: a four-spindle, two-way Model 222 Heald; a double-end, two-spindle Heald; a single-end Heald with a three-spindle cluster; and a single-end, single-spindle Heald for precision-boring a deep hole held to 0.7453-0.7460 in. in diameter. The three-spindle cluster machine is required to bore two holes, held to 0.625-0.626 in., and one stepped bore held to 0.625-0.6265 and 0.3110-0.3125. Apart from the close tolerances on the bores, the most important consideration is that of maintaining centers. Special attention was paid to the precision mounting of boring heads to assure that centers from bore to bore are held to plus or minus 0.001 in. without cumulative error.

Tolerances on the various precision boring operations are held to exacting limits. For example, the bores in the sides and front face of the case are held to a total tolerance of 0.002 in. Boring of the rear face, which constitutes the pilot for the output shaft bearing, is held to a total tolerance of 0.0008 in.

Other tolerances on the case are: reamed holes held to 0.001 in. total tolerance, bore centers held to 0.001 in. total tolerance, while the overall distance from the milled bottom face to the main line bore is held to plus or minus 0.001 in.

Turning to the assembly department, as mentioned earlier all final assembly operations are housed in a self-contained, air-conditioned room. In this compact area is found the final assembly line about which are grouped the various sub-assembly conveyors and benches. These are so arranged as to permit sub-assemblies to meet the final assembly at the point of installation. Machined parts intended for sub-assembly or for final assembly come in from the machine shop on monorail conveyor feeder lines. A smaller assembly conveyor serves for the sub-assembly of the case extension.

Vendor parts and sub-assemblies such as bands, pumps, and the gear unit (which is produced at the Kercheval plant of Detroit Gear) are given formal tests in the assembly department before installation. For example, the bands are inspected in a special machine designed to impose a high shear load on the anchor lugs to make sure the joint will stand up under overload conditions. Each of the pumps is tested 100 per cent for rate of flow and pressure.

As the final assembly is progressively built up on the conveyor and the unit is completed, it is delivered to the final test section along one wall of the department where each drive is put through its paces in one of the special dynamometers. As illustrated, the test dynamometer is equipped with a group of eight gages, each one checking a specific function of the drive. In addition to checking pressures in the system for each maneuver, the operator is required to watch the behavior of shift cycles for standard operation and also to watch for noise patterns which may be objectionable.

Any deviation from specified performance in any of the variety of functions inherent in the Borg-Warner drive is cause for rejection. If a unit requires repair or adjustment following rejection, it must return to the test machine for verification before acceptance.

A noteworthy feature of the test setup is the provision of a central oil filtering and conditioning system which serves the test stands as well as the testing machines for the front and rear pumps. Oil is circulated to these machines from the main storage tank. Used oil, in turn, is returned to a large sump by piping from each of the test machines.

Oil from the sump or settling tank is pumped to a centrifugal separator where it is centrifuged to remove dirt and impurities. It is then transferred to the storage tank for re-use. It is of interest that the storage tank is insulated and heated under thermostatic control to maintain the fluid at a constant temperature of 150 F. At this temperature, the special fluid used for testing is considered equivalent to 10W oil, specified by Studebaker, at a maximum operating temperature of around 250 F.

NEW EQUIPMENT

(*Continued from page* 55)

built for fast, accurate grinding. Bearings are completely enclosed, protected against dust. Rotation of table can be controlled either manually or by an adjustable speed reducer, which can be located below the table.

A ¾ hp motor mounted on a counter-balanced sliding head furnishes direct power to the grinding wheel, which can be adjusted rapidly in any vertical setting.

NEW PRODUCTS

(*Continued from page* 57)

P-33—Vinyl Coated Fabrics

To establish a more distinctive family name for all of its vinyl coated fabrics and unsupported film yardage, Columbus Coated Fabrics Corp., Columbus, Ohio, announces a change from the term Plastovin, used temporarily, to "Col-O-Vin" — the firm's better known trade-marked name. As quickly as possible all advertising, sales literature, display materials and sampling folders, will be changed to carry the "Col-O-Vin" identification, and all vinyl yardage manufactured by the company will be marketed as newly designated.

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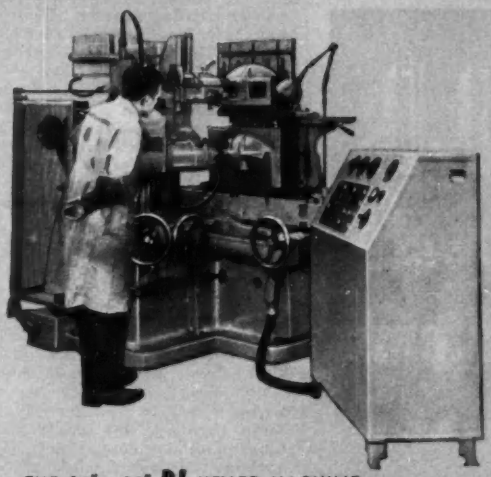
WITH THE *NEW* PRATT & WHITNEY BL KELLER MACHINE

at high speeds . . . brings greater profits

NEW FEATURES

make the new Keller Machine extremely fast for reproducing exact contours from any master form



THE 24" x 16" BL KELLER MACHINE

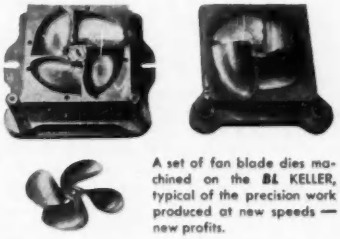
— new, speedy automatic tracer operating in conjunction with newly designed electrical circuits.

— new, increased range of travel rates, from .5" to 30" per minute, conveniently controlled by operator from his normal working position.

— new, automatic speed control provides continuous variation of individual machine motions in proportion to the slope of the shape being traced, with the tracer gliding smoothly over any contour 2 or 3 times faster, regardless of shape.

— new and greater selectivity of the most suitable feed for any job by means of newly designed single-unit feed contactor, with feed range from .010" to 4" in steps of .010".

— new electrical design permits direct connection to any conventional 50 or 60 cycle polyphase power supply.



A set of fan blade dies machined on the BL KELLER, typical of the precision work produced at new speeds — new profits.

LOOK into it — the new BL KELLER (24" x 16" and 36" x 20") gives you a competitive advantage you cannot afford to overlook when it comes to the accurate duplication of templates and models by automatic, tracer-controlled milling in the production of dies, molds, patterns, prototypes, short-run parts — 2 dimensional and 3 dimensional. Its new speed substantially reduces actual machine hours, a performance factor of tremendous profit potential. Bulletin gives all the facts; ask for it.

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MACHINE TOOLS • CUTTING TOOLS • GAGES

90th Year

SYMBOL OF ACCURACY SINCE 1860

What Is Russia's Industrial Strength?

(*Continued from page 37*)

ous types of manufacturing also imposes needs for efficient transportation. For example, Voronezh in south-central Russia produces nearly all Soviet synthetic rubber, while Gorkii and Moscow still make fully four-fifths of all Soviet trucks and cars (see map).

Yet the transportation network is weakly developed in the USSR. Railroads move the overwheming part of the freight, including bulky cargoes such as petroleum, timber, grain and ores. But the railroad network is well developed only west of the Volga. Moscow is its heart, with eight major lines and seven large-capacity belt lines and laterals radiating from the capital. From Yaroslavl south there are but seven rail crossings of the Volga, the southernmost being at Saratov. East of the Volga, genuine networks exist only in the Urals and Kuznetsk Basin. In the east, the Trans-Siberian Railroad to Vladivostok, with feeders to Magnitogorsk and the Kuznetsk Basin, and the lines from Kirov to Molotov, and probably Karaganda to Magnitogorsk, alone are double-tracked. The important lines serving Central Asia are all single-tracked, and of light construction.

During World War II about half of the rail mileage in the Soviet Union was destroyed or damaged. The Fourth Five-Year Plan contemplated rehabilitation of the war-damaged lines in the west, and new construction, notably the Magnitogorsk-Kuznetsk Basin or South Siberian Line, in the east. While the evidence is not clear, it appears that rehabilitation has been largely accomplished but that new construction lags.

Other forms of transportation in the Soviet Union are definitely of secondary importance. Among waterways, only the Volga-Caspian system, ever faced with the problem of dropping water levels, is of great significance. The famed Northern Sea Route connecting the Atlantic and Pacific via the Arctic is important only between North Russia and Western Siberia. Farther east, it is open less than two months a year, and carries negligible traffic. Highways and pipelines have but a rudimentary development, though the Saratov-Moscow gas line, built with Lend-Lease pipe and equipment, has considerably relieved the capital's fuel shortage.

Finally, it is important to note the adverse effects of Soviet climate on transportation. Even the Caspian-Volga system is closed by ice between December and April. Railroad capacity is sharply reduced by winter snow and cold, as well as by spring thaws. In January, for instance, decreased efficiency resulting from low temperatures reduces the capacity of the entire Soviet network, excluding the Ukraine, Caucasus and Central Asia, to an average of 70 per cent of its warm-weather capacity. In Siberia, the reductions are even greater, up to 50 per cent. Such variations in transportation capacity are reflected, of course, in the annual fluctuations of the entire Russian economy.

TECHNOLOGY—The aim of Soviet technology seems to be achievement of workable and simple, even if crude and wasteful, solutions to economic problems. Sometimes the results are poor, as in the extraordinarily inefficient gas-producer vehicles manufactured during World War II to run on fuels such as peat and firewood. At other times, they are very effective, as in the use of high-grade cast irons for

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Whether it's a spring for heavy-load trucks or easy-riding cars you're after, Tuthill can supply it.
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A complete line of leaf springs
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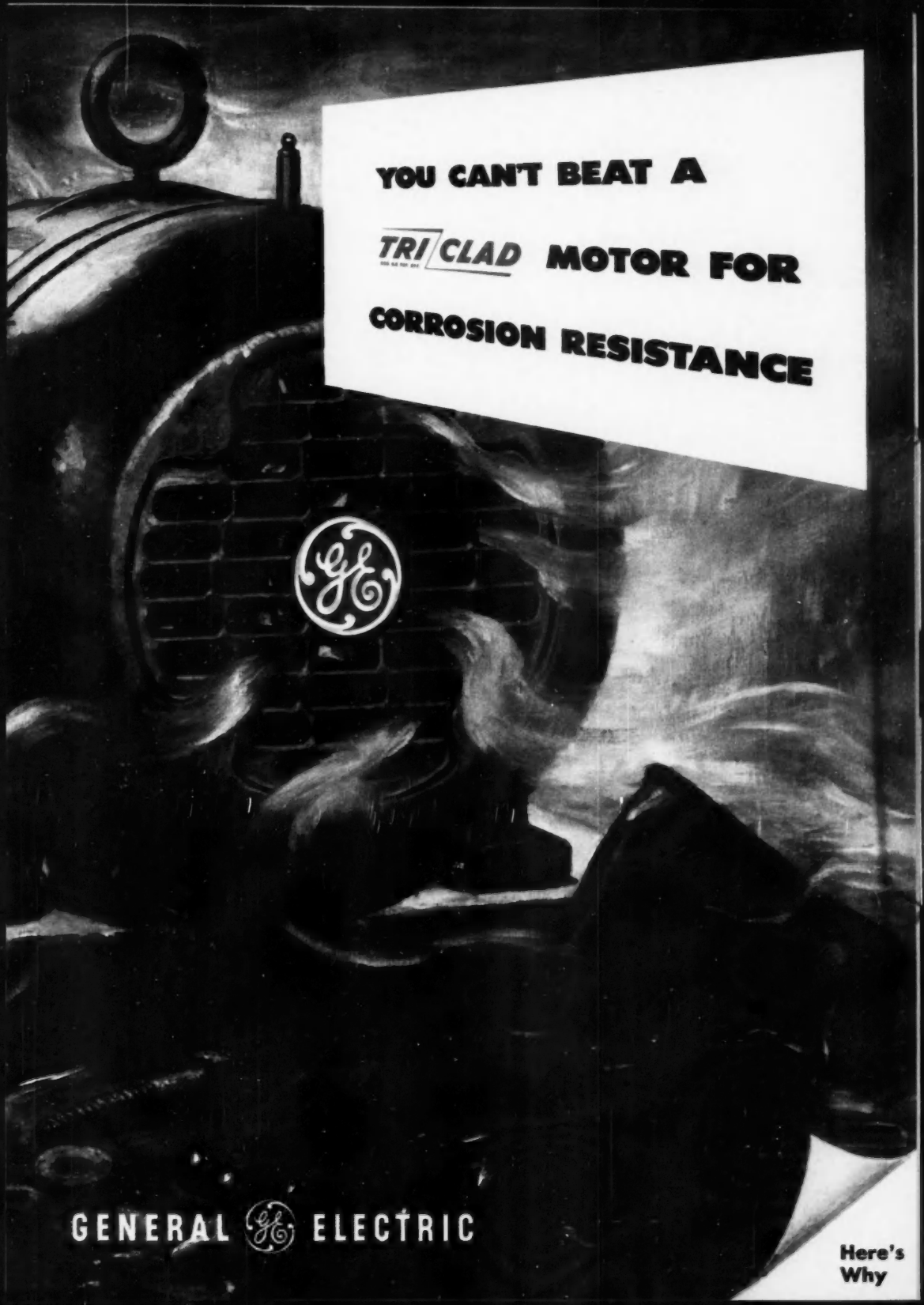
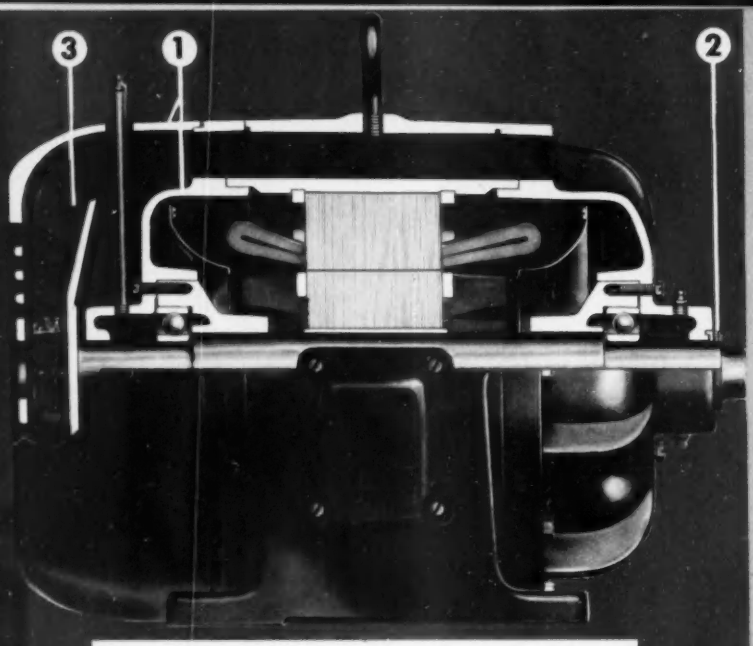

YOU CAN'T BEAT A
TRI CLAD MOTOR FOR
CORROSION RESISTANCE
GENERAL ELECTRIC
Here's
Why



Here's the totally enclosed Tri-Clad double-shell structure (1) that locks out dirt, flying metal chips, abrasive dust and corrosive fumes. Check the rotating labyrinth seal (2) which prevents foreign matter from working in along the shaft. Note the cast-iron housing, the corrosion-resistant G-E Textolite* material cooling fan (3). Fan circulates cooling air between the shells—no contaminated air touches the punchings or inside parts.

You can't beat TRI CLAD motors for corrosion resistance

Acid fumes, alkali dust, dye-house vapors, tropical weather – you name *your* motor "poison." You just can't beat Tri-Clad cast-iron construction for corrosion resistance.

Rolling up 6 billion hours of service on all kinds of jobs, more than 1,876,000 Tri-Clad motors tell the eye-opening story of cast-iron motor structure. You get an inherent damping action that minimizes noise and damaging vibration. You get rigidity that makes for permanent shaft alignment. (Try bolting a Tri-Clad motor to an uneven surface – the bolt will snap before you can twist the rigid frame out of line.) You get extra protection against jarring blows and rough handling. You get resistance to rust and corrosion that is not approached by any other metal used for standard motor construction today.

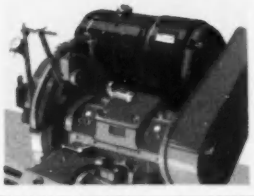
WANT MOTORS THAT STAY ON THE JOB ANWYHERE? There's a stock of Tri-Clad motors near you, in nearly all types and ratings, ready for **IMMEDIATE SHIPMENT**. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

*Reg. U. S. Pat. Off.
(standard on popular sizes)

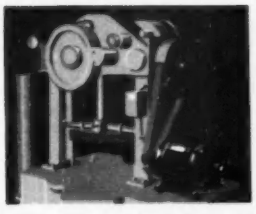
GENERAL ELECTRIC

YOU CAN'T BEAT TRI CLAD EXTRA PROTECTION

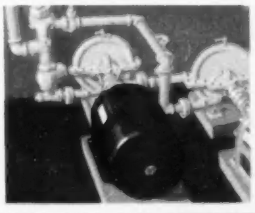
G-E capacitor motors for use on fans, blowers, pumps and compressors with single-phase power. From ¼ to 5 hp.



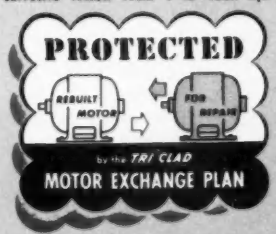
G-E Type ACA induction motors for adjustable speeds—provide speed ranges from 3-1 to 20-1. From 3 to 75 hp.



G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



Look for this EXTRA on the motor you buy!

artillery projectile points, even of armor-piercing types.

Although examples of Russian inventiveness may be given in fields as diverse as tanks, blast furnace designs, and insecticidal soap, the most common pattern—one of the greatest shortcuts in Soviet technology—has been to copy foreign designs. While this practice was fully understandable at the dawn of Soviet industrialization, two decades ago, the degree of its continuation today is remarkable. Thus, every truck and car manufactured in the USSR today is a copy or slight modification of a foreign, generally American, prototype. In addition, seven of the projects of the research plan of the All-Union Scientific Research Institute of the Auto-Tractor Industry (NATI) for 1949 called for the detailed testing and investigation of American tractors.

While such an imitative technology gains the advantage of using well-tested designs, it also leads to a lag which may grow rather than diminish. Thus, in the automotive industry, Soviet truck and vehicle designs lagged three years behind America in 1932, and now lag by a full decade. Closely allied to such lag have been Soviet difficulties in achieving model changes. Voluminous data on the automotive and vehicle-parts industries show that, in general, new model vehicles and parts require three to five times as much production time in the first year of output as the old, and from three to five years are needed to achieve designed production norms. An extreme illustration is given by the changeover of the Kharkov Tractor Plant from wheeled to track-laying tractors in 1936-38. From September, 1936, to April, 1937, total output dropped by 46 per cent. Then it ceased entirely until September, 1937, and achieved a level of 40 per cent of the previous production only in March, 1938.

In the postwar period, the Gorkii Automotive Plant (GAZ) has been committed to increase output from 75,000 vehicles in 1945 to 150,000 in 1946, and 300,000 in 1950. At the same time, annual production per employe in 1946 was to be 1.18 times as great as in 1940, rising to 2.23 times in 1950. Two new vehicles were to be produced, the GAZ-51 truck using the GAZ M-11 (1939) engine but otherwise representing a full changeover, and the GAZ M-20 passenger car. These changeovers were expected to lower productivity. According to a report by Vlasov, the plant director, the GAZ-51 would require over five times as many man hours to produce in 1946 as the GAZ-AA needed in 1937-40. Not until 1950 was production time for the GAZ-51 expected to approximate that for the GAZ-AA in 1937-40. Consequently, a net increase in production per worker by 1950 had to be achieved by simultaneously continuing peak output of the old GAZ-AA with increasingly greater efficiency. With a GAZ 51-M20 to GAZ-AA ratio of about 17 to 13 in 1950, the output per worker of the latter would have to be five to 10 times as great as in 1937-40. In other words, the plan at GAZ required reaching a production efficiency for the old GAZ-AA by 1950 that would exceed that of Ford for the Ford model A in 1928 to offset the heavier time requirements of the new models. The same conclusions may be reached for the plans and operations of the Soviet automotive industry as a whole even including the mendaciously publicized changeover at the Moscow Automotive Plant (ZIS). Illustrations of comparable situations but less ambitious plans in automotive electrical-equipment production are given in Table 1. In general, continued production of obsolete equipment, albeit at higher efficiencies, is a necessity for Soviet industry if quantitative goals are to be met.

Another long-evident characteristic of Soviet technology has been high waste. For example, the consumption of coking coal per unit of pig iron runs 40 per cent higher than in the United States. In the automobile industry, rejected castings were running up to 20 and 25 per cent in 1947, while the

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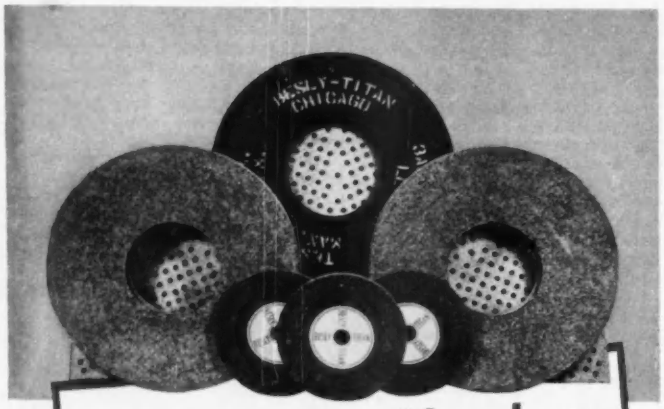
losses in casting tractor-engine cylinder blocks ran up to 16 per cent in 1949. These levels of wastage have existed despite the ministrations of a host of checkers, testing every item produced. A study of the Moscow Automotive Plant by Gostev shows that 18.8 per cent as many checkers as actual production workers were being employed in the manufacture of the ZIS-5 in 1941. In 1946, the time required for checking ranged from 11.4 per cent to 123.1 per cent of that needed for the machining of various parts. According to Gostev, a reduction of almost 50 per cent in the number of checkers at ZIS could be accomplished with the introduction of mechanical and electronic automatic-control equipment. An improvement in the quality of production which would permit sampling rather than 100 per cent check would result in further savings.

The most important postwar development in Soviet technology has been the preparation and publication in 1946-1949 of a monumental handbook of machine-building (*Mashinostroyenye. Entsiklopedicheskii Spravochnik,* 14 vols.). This handbook is equivalent to such manuals as those of the American Society for Testing Materials and the Society of Automotive Engineers. Based on a comprehensive digest of foreign and Soviet experience, it provides technological standards, uniform testing procedures, and methods of computation and design for major sections of Soviet industry. It provides the foundation for a flexible standardization of materials and processes. The ultimate effects of such technological standardization — one of the prime advantages of American industry over those of Britain and the Continent—can scarcely be overestimated.

Other new trends are greater emphasis upon diversification and production to meet special requirements; lack of such an emphasis has been one of the basic weaknesses of Russian industry. Thus large numbers of new alloy steels and of specialized equipment, such as highly mobile 6 x 6 trucks with independent suspension, are now under development or in production. More adequate testing and better engineering are being introduced. For example, automatic equipment has been installed for some operations, such as the welding of GAZ-51 wheels. Internal transportation and storage in factories is being improved; for example, by the use of specialized carts and gravity—feed bins. Above all, there is intensive use of existing capacity. For example, both blast and open-hearth furnace operation considerably exceeded 100 per cent of capacity in 1949. Again, the plant changeover at ZIS was marked by jamming large numbers of additional machine tools in the originally-crowded floor space. The number of tools in the cylinder-block shop increased from 52 to 68; in the crankshaft shop, from



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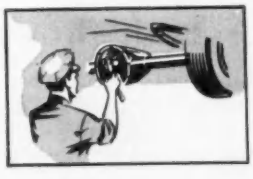

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ECONOMIC MANAGEMENT: Russian economic planning and administration has been vigorous and purposeful. From the beginning of the Five-Year Plans, the same strategic concepts have been dominant: primary emphasis upon heavy industry, maximum development of the secure area between the Volga and Yenisei Rivers, achievement of self-sufficiency in critical materials, and ease and rapidity of conversion from civilian to military production in times of crisis. To achieve these goals, the Soviet government has made maximum use of its material and human resources. The mere recital of legal hours of work is insufficient to mark this difference between Russia and the United States. One must note that, according to the legal provisions in effect in 1948, workmen were prohobited from quitting their jobs except with the permission of the plant director, under penalty of two to four months' imprisonment. Absenteeism is defined as loss of more than 20 minutes' time from arriving late at work, taking too much time for lunch, or leaving early; or loss of less than 20 minutes thrice in one month or four times in two successive months. Penalties for such "absenteeism" range up to six months' compulsory labor at 25 per cent reduction in pay. Overtime work as deemed necessary is compulsory (up to certain limits), except for disabled veterans, workmen with active tuberculosis, and children under sixteen.

Another measure taken to achieve Soviet aims has been the concentration of effort on selected targets. This has made possible excellent quality and large-volume output in some fields, such as ground-ordnance production. On the other hand, there has been deliberate neglect of other areas, including not only consumers' goods, but the expansion of the transportation network and, above all, distribution, storage and maintenance. Clearly, these policies have had adverse as well as positive results for the Soviet economy. During World War II, only Lend Lease saved Russia from the effects of inadequate development of many unanticipated needs, such as signal equipment, aviation gasoline, and others.

As is well known, the Russian economy is organized in a tight pyramidal structure, which facilitates the execution of orders and rapid redirection of the economy, but greatly hampers the exercise of initiative at operating levels. Furthermore, lateral cooperation between factories, trusts and even Ministries is made difficult by secretiveness, jurisdictional jealousies, and bureaucratic procedures. To break the resultant bottlenecks, the State Planning Commission, especially during World War II, has acted as an expediting agency as well as a long-range planning body. Non-industrial agencies, such as the Communist Party, youth groups and Labor Unions are mobilized to spur industrial efforts.

While major errors, such as in the handling of collectivization, marked the early history of the Soviet economic management, evidence of increasing flexibility and maturity is growing. The currency revaluation of 1947 was successfully carried out. In 1947, also, practical considerations led to a change of emphasis in investment from the eastern regions to the Ukraine. Yet other measures advanced recently, such as the great shelter-belt program launched in 1948, promise enormous expenditures with dubious chances of success.

Part Two of this two-part article by Mr. Shimkin on Russia's industrial strength will appear in an early issue of AUTOMOTIVE INDUSTRIES.

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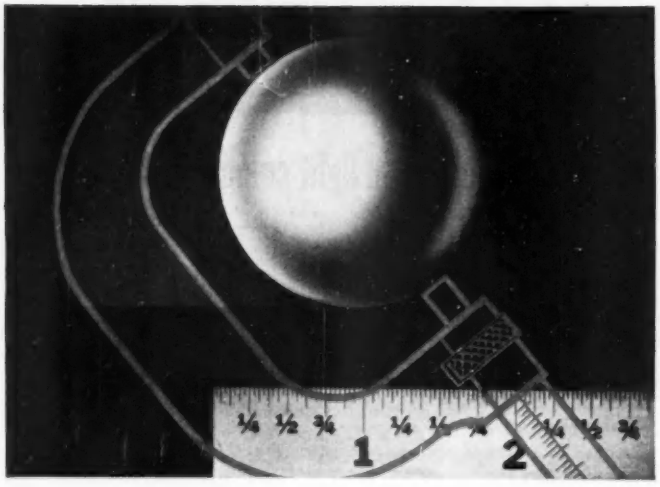

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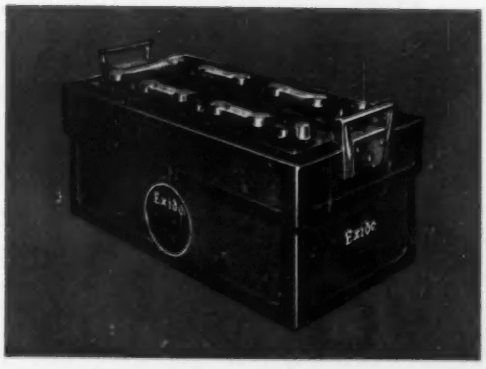

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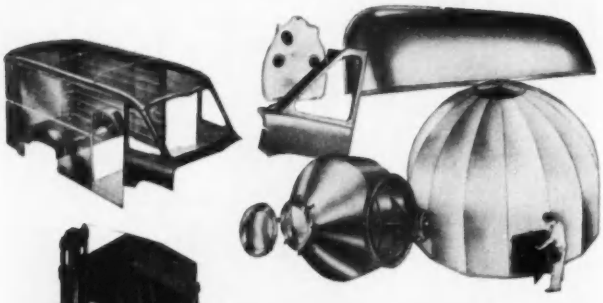

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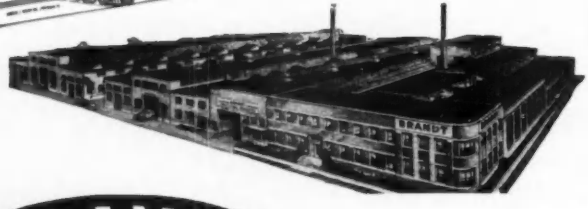

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Publications Available

(*Continued from page* 58)

L-34 Seamless Tubing

Tube Reducing Corp.—A new 16-page booklet on seamless tubing covers ferrous, non-ferrous and bimetal applications. The booklet is well illustrated with photographs, drawings and tables, contains tolerance, finish and application data on compression-formed tubing. Tables with Profilometer readings for close-tolerance tubes and a drawing covering depth of decarburization are included.

L-35 Cleaning Compound

Magnuson Products Corp. — A new booklet, entitled "Permag Cleaning Compounds in the Automotive Industry," is designed to offer information on various cleaning operations required for maintenance and repair purposes. General reference is made to the operation and the specific materials required for such operations. Items covered are Motor Block cleaning, steam cleaning, parts cleaning, radiator cleaning, body washing, paint stripping, etc.

L-36 Single Spindle Automatics

The Cleveland Automatic Machine Co.—A new bulletin has been issued covering the 3 3/4-in. Model A and 5 3/4-in. Model A Single Spindle Automatic Machines. The 2-color booklet includes many photographs of the two models, design and construction features, specifications, etc.

L-37 Automatic Lathes

Pratt & Whitney—Circular No. 492 describes and illustrates the Model "C" 1½ x 18 in. Full-Automatic Lathe. The features of the machine are described and illustrated; various jobs the lathe will handle, construction details and additional equipment available, together with specifications, are given.

New Brake System

(*Continued from page* 52)

seal between the liquid and the air at this point. On its return the piston drives out the air which can escape only through the ball check valve (11) into the reservoir (2), above the level of the liquid. A pressure relief valve in the reservoir filler cap maintains the pressure at about 14 psi when the system is at rest. If the pressure should fall below about seven psi, warning is given by a luminous signal on the instrument panel. If the pressure drop is due to air leaks at the master cylinder or reservoir, the operation becomes that of an ordinary brake. If it is occasioned by a loss of liquid, the driver is warned in time.

Farina brakes have been in use for some time on Alfa Romeo road racing cars. Recently their production in France has been taken up by the Lavalette Co. of Paris.

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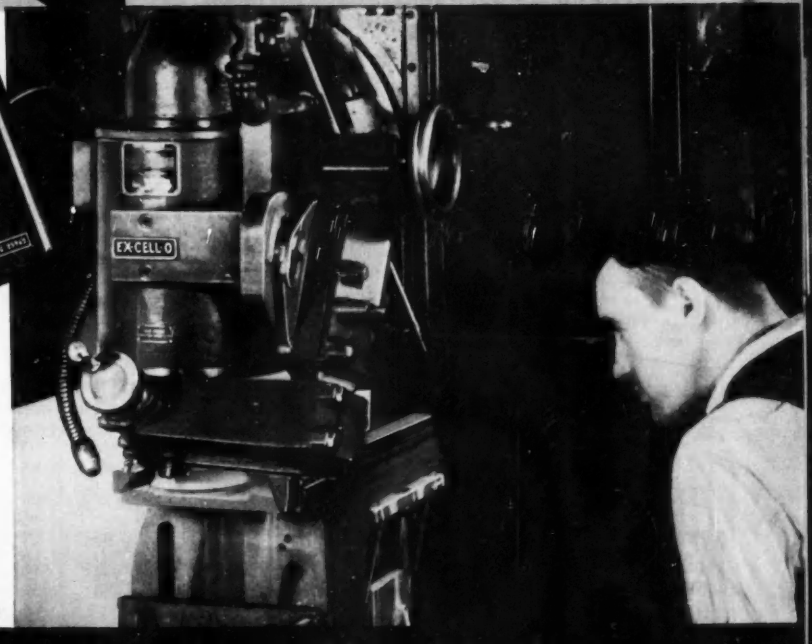

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IHC Truck Plant

(*Continued from page 43*)

Backing plate holes are drilled by means of eight-spindle clusters at each end.

The boring head is about 9¼-in. in diameter, designed for boring as well as rough- and finish-facing of the flange. It is fitted with solid triangular-shaped bits of cemented carbide. An important feature of the boring head is provision of an automatic indexing cycle in which the head is indexed at the start to clear through the gear slots in the banjo flange. The head then moves into the work and does the cutting on the out stroke. This procedure eliminates the usual burrs on the inside surface of the flange.

In addition to the three main heads of the machine there is a small angular head for drilling a single vent hole. The cycle of this machine is extremely fast, the operations described above being completed in a floor-to-floor time of two min and 41 sec.

The second machine of the pair, another special W. F. & John Barnes unit, is a two-station machine for drilling and tapping the carrier flange in the housing. The first position drills and chamfers a cluster of 12 holes. Then the work is indexed over to the second station for tapping the 12 holes. In addition to these major operations the machine has a small angular tapping head mounted on the tapping station for tapping the single vent hole drilled by the first machine.

An interesting aspect of the four pairs of machines for the housing job is that they handle six different housings. The first pair, described above is for the L-120 only, another pair is for the L-180 only. The third battery takes both L-130 and L-150 housings. These housings are essentially alike except that one has six backing plate holes while the other has four. The holes are on the same diameter bolt circle, hence only a change in spindles is required to change over from one to the other.

Similarly, the fourth battery takes both L-160 and L-170 housings. These two differ only in length and this is compensated by making the drill clusters and locators movable for one position or the other against fixed stops.

An example of one of the latest techniques in the welding field is the Shield-O-Matic arc welding machine designed by the National Gas Cylinder Co., for seam-welding the stamped oil pan to the banjo flange. As illustrated, the housing is mounted on a central indexing fixture which is power-driven to turn the work around the 360 deg circle under the welding head. The machine, using welding electrodes of special design, is capable of making a tight welded joint after the metal has been treated with a sealer. With this equipment it is possible to handle the welding operation without washing either the housing or the stamping.

Perhaps the biggest change has taken place in the assembly department. The layout is completely new, with new assembly lines and an intricate network of overhead feeder conveyors. Briefly, there are now three frame lines; two parallel final assembly lines; and three doll-up lines prior to final inspection and acceptance.

The illustrations shown here provide a sampling of some of the interesting phases of assembly line operation. One feature is a unique turn-over fixture which greatly facilitates this operation. Another point of interest is the section of suspended assembly conveyor. Here the chasses are picked up on the suspended conveyor and mounted on balanced carriers designed to keep the work in good alignment while moving and cornering. This is done to facilitate the movement of frames through the DeVilbiss paint spray booths, permitting the operators to easily reach all parts of the mechanism including the underside.

Following painting, and while the chasses are still suspended, wheel and tire assemblies are installed. The usual hard manual labor involved in this operation is eliminated by the installation of rail-mounted hoists on each side of the line.

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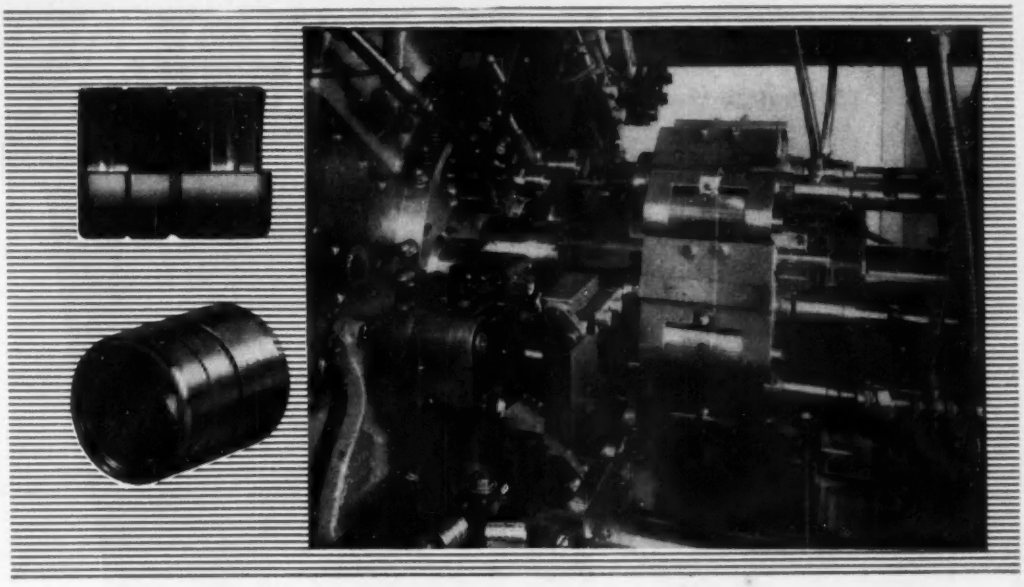

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Typical of this versatility of tooling is the setup illustrated: four independently operated, internal recess-milling tools, two for roughing and two for finishing, are used, together with a shaving tool on the O.D.

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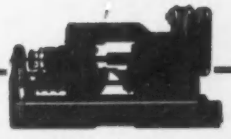

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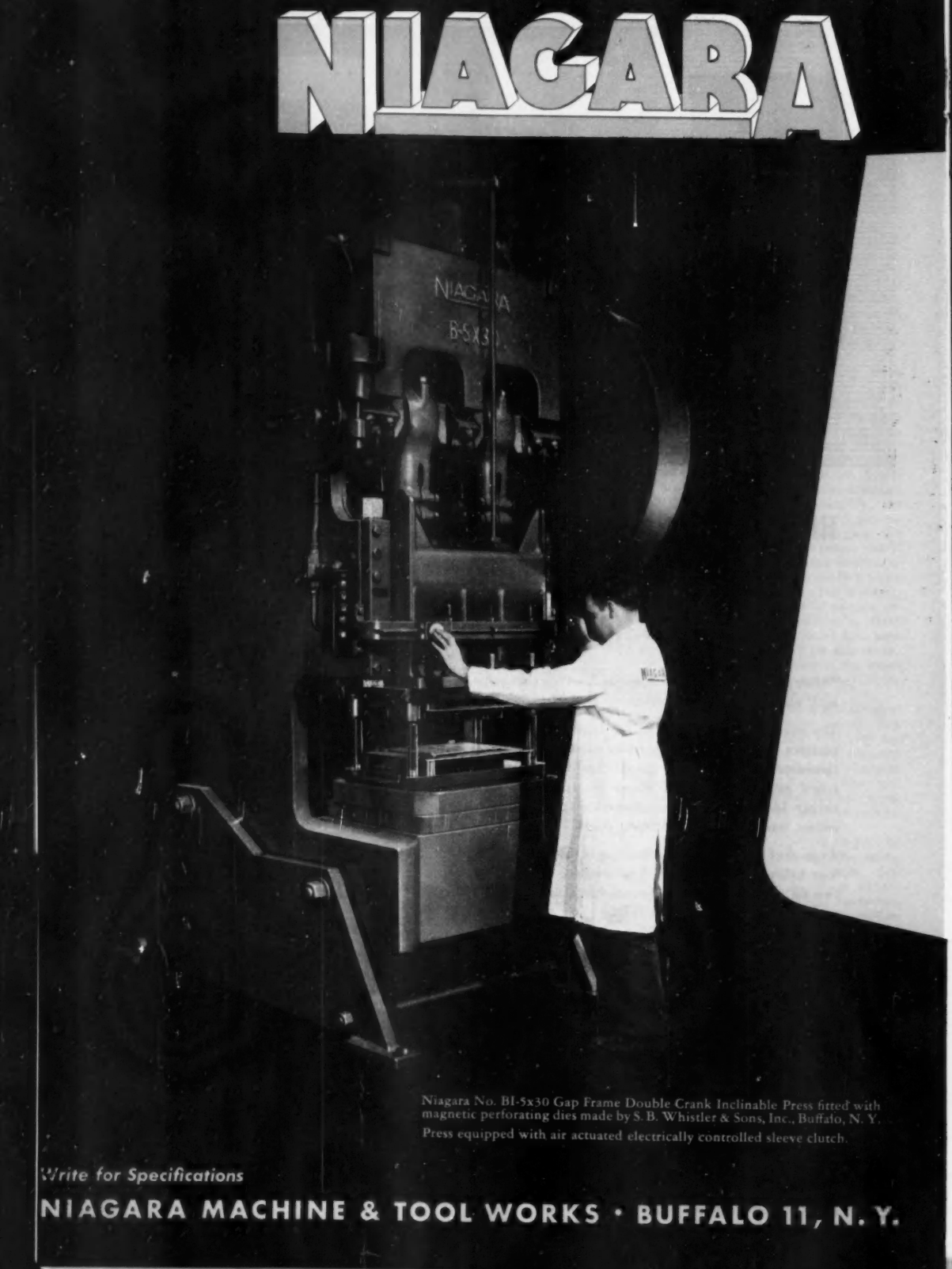

Niagara No. BI-5x30 Gap Frame Double Crank Inclinable Press fitted with magnetic perforating dies made by S. B. Whistler & Sons, Inc., Buffalo, N. Y. Press equipped with air actuated electrically controlled sleeve clutch.

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PRESENTS The NEW

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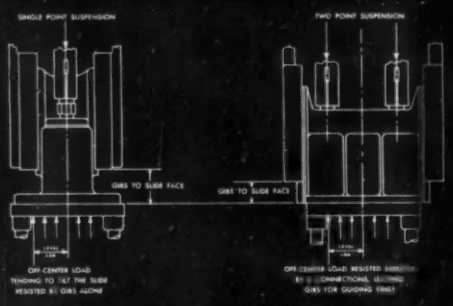


- Gives full support to wide dies, impossible to obtain on the conventional single point Inclinable Press even with slide flanged out.
- Gibbing may be brought closer to point of load application on this double crank press than with flanged slide single crank design.
- Two point suspension resists tendency of slide to tilt under off-center loading conditions.
- Niagara gap frame construction gives equal access to all four sides of die. No ribs or shafts extending across the back of press.
- Inclined position permits finished work to drop off the rear of the press.
- Gearing enclosed and running in oil.
- Backshaft mounted on anti-friction bearings.
- Air counterbalance for slide.
- Bronze bushed main and connection bearings.
- Niagara electrically controlled air actuated sleeve clutch.
- Air releasing brake.

Similar presses are made in sizes ranging from 3½" to 6½" diameter shaft. Sizes 3½" and 4" are made with mechanically operated sleeve clutch.

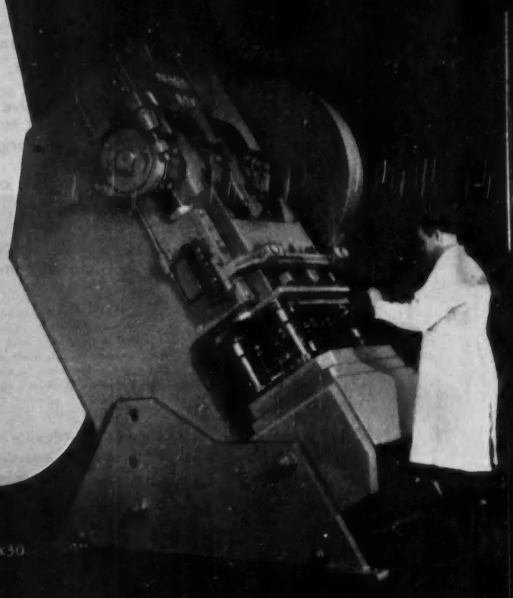


Illustration shows Niagara No. BI-5x30 press in inclined position.

Manufacturers of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

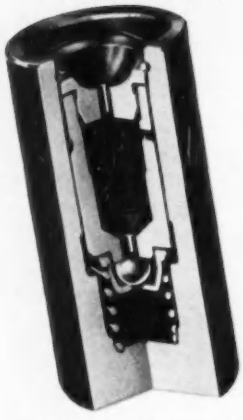
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

Tappet Noise

with

HYDRAULIC VALVE LIFTERS

Use Hydraulic Valve Lifters in your engine to put a stop to tappet noise and gain these five additional advantages . . .



1. Elimination of valve clearance adjustments.
2. Longer valve life.
3. Smoother engine performance.
4. Absorption of cam tolerances and runouts.
5. Automatic compensation for expansion and contraction of engine parts.

Let us tailor a Hydraulic Valve Lifter to your present or future automobile or truck engine design. Our current production rate is more than sixty-five thousand units a day.

Read the complete story of our Hydraulic Valve Lifters in this bulletin designed especially to inform automotive executives.

DIESEL EQUIPMENT DIVISION

General Motors Corporation

GRAND RAPIDS, MICHIGAN

MEN *in the* NEWS

(*Continued from page* 25)

Allegheny Ludlum Steel Corp.—The appointment of **George I. Bottcher** as Chief Engineer has been announced. **J. F. Chapman** and **R. E. Smith** have been made assistants to the Chief Engineer.

The B. F. Goodrich Co.—**Paul Codman Cabot** has been elected as a director of the company.

Partial Mobilization

(*Continued from page* 41)

security clause permitting recapture. It has leased still others under the same conditions. Theoretically, 120 days or less would be required for reconversion, since there are standard machine tools and other production equipment in standby storage as well as on lease in connection with rented-out plants.

The trouble lies in the fact that there is no reliable figure as to how much of this basic equipment could be put to work immediately. In the first instance, it is not known how many items are usable without a complete overhauling and replacement of parts. In the second case, it is not known how many nor what kind of items are rented out in connection with leased plants.

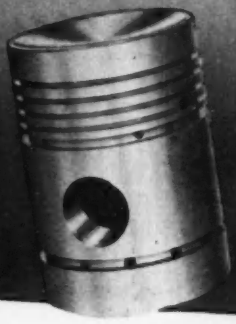
This is because the Government has never gotten around to taking an inventory. When responsibility for leased plants, other than the few plants under RFC jurisdiction, was turned over to General Services Administration for "housekeeping" purposes, that agency found itself the custodian of $40 million worth of equipment lumped under the heading of "related personality." This includes everything from cash registers to drill presses and even complete shops.

Taking inventory of this "related" plant equipment and breaking down into general categories by pulling out individual contracts and extracting such information is a must item for regional GSA offices when they are set up, probably in late September.

In the meantime, recognizing that the outlook could be changed overnight, a week after the White House requested modified controls, it looked like business as usual—with some reservations. The biggest reservation—if actual hostilities remain confined to Korea.

Large as it is, the $10 billion requested for additional defense expenditure is seen as only a small percentage of the national product, currently running at a $270 billion rate. Moreover, at least one fourth of the amount would be needed for administrative costs, including compensation for additional civilian and service personnel, and purchases of soft goods. The remaining $7.5 billion would be spread among the hard or durable goods industries. Not more than $1.5 billion seems likely to affect the automotive industries.

Air Craft



Diesel

Trans Slot

Wing Insert

Two Cycle

Steel Truss

Turbulator head

T-Slot

Trunk Type

Every Type Aluminum Piston ...*One* Standard of Quality

STERLING

Leaders in Aluminum Pistons for 30 Years

Sterling Engineers will work with you as they have with other leading manufacturers in developing pistons to meet your exacting requirements. Wire or phone.

STERLING ALUMINUM PRODUCTS INC.

ST. LOUIS, MO.

Introducing

H-P-M TWIN-POWER!

THE CHALLENGE TO INCREASING COSTS!

Here is a new and successful press to speed up production (up to 70% more strokes per minute) over conventional mechanical presses . . . enables you to use low cost non-premium metals for deep drawing . . . cuts scrap loss to the bone! Yes, H-P-M Twin-Power is a mechanical press . . . but a vastly different type of mechanical press. By employing hydraulics for: — rapid advance of slide to the work . . . for controlling pressures . . . for protection against overload . . . it wipes out the shortcomings of the conventional mechanical press. Think of the tremendous production possibilities opened to you with versatile, economical Twin-Power. Call in a nearby H-P-M Engineer to go over it with you in detail . . . to show you where it can serve you most effectively.

HERE'S WHAT H-P-M TWIN-POWER WILL DO . . .

Up to 70% more strokes per minute with no increase in draw speed.

Up to 45% reduction in draw speed with conventional number of mechanical press strokes per minute.

50% additional pressure at mid-point of slide stroke.

Full pressure for first 1/2 inch below mid-point of slide stroke.

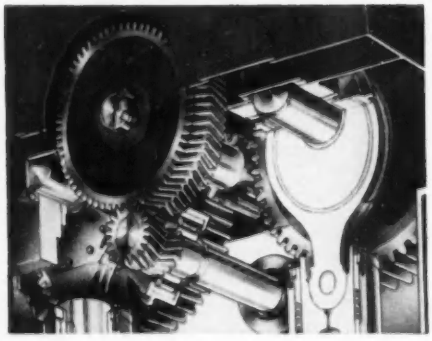
Faster, "foolproof" die setting—no screw adjustment—it's done hydraulically.

No die impact when maximum draw depth is used—hydraulics provide automatic slowdown to zero just before die contact.

Positive overload protection—through predetermined pressure adjustment.

Known adjustable pressures—through hydraulics.

Modern, all-welded, stress relieved, frame construction designed for maximum rigidity and a minimum of deflection.



HOW IT WORKS!

The H-P-M Twin-Power press differs from the conventional mechanical press in three important ways. One—the first half of the stroke is accomplished hydraulically, the second half with a conventional mechanical eccentric drive. Two—an eccentric of only one-half the size of a comparable conventional mechanical press is required by H-P-M Twin-Power. Three—50% additional pressure is available at mid-stroke making Twin-Power more applicable to a wider range of work. The H-P-M Twin-Power gear drive mechanism is simple . . . efficient . . . compact. It is fully enclosed and running in oil. It is built for maximum strength and a minimum of torsional deflection. The air operated clutch and brake is quick-acting . . . dependable . . . cool operating. All components are backed by 70 years of experience in serving the metal working industry.

THE HYDRAULIC PRESS MFG. COMPANY

3012 Marion Road • Mount Gilead, Ohio, U. S. A.

Irregular shaped parts like this 68½" long windshield header panel for trucks are formed and embossed at the rate of 400 per hour on H-P-M Twin-Power. This part is of 20 ga. steel, 11½" wide at center and 15¾" wide at each end where 4½" draws are made.

mail this coupon TODAY!

The Hydraulic Press Mfg. Company
3012 Marion Road
Mount Gilead, Ohio

We are interested in knowing more about this revolutionary press. Send me a copy of H-P-M Twin-Power Bulletin 4903.

COMPANY NAME _____

INDIVIDUAL _____ POSITION _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Metal Adhesives

(*Continued from page 40*)

ing stabilized trichlorethylene. Magnesium alloy details obtain their original cleaning during the preliminary operations of Manodizing and priming. Fingerprints and other soil are removed immediately prior to spraying with cement, by wiping all detail parts with a clean starch-free cheese cloth, dampened with low-flash naphtha. A low aromatic naphtha is used because the thin coat of primer previously applied to magnesium alloy parts must not be softened excessively.

After the parts have been thoroughly cleaned, the solvent is allowed a few minutes time for drying, after which two thin spray coats of M3C cement are applied. At least five minutes drying time is allowed between coats. After the second coat has been applied, this cement is allowed to air dry for a minimum of twenty minutes and a maximum of eight hours. As mentioned previously, laboratory tests are now under way which indicate that it may eventually be possible to omit the spraying operation.

After the sprayed cement has dried, the stiffening members are placed in a fixture provided with locating pins and blocks for each assembly. These parts are held in place temporarily with paper tape, and Metlbond film is applied to the faying surfaces. Doublers are located on the skin, and the locating fixture, with stiffeners attached, is then inverted and placed on the skin and doubler assembly. It has been found that double film thickness at corners and at other splices does not materially effect strength characteristics. Consequently, delicate fitting at such points is not required. Double thicknesses are applied at corners, at splices, and sometimes at joggle areas when it is desired to fill a small void completely with cement.

When applied, the film is sufficiently tacky to adhere to faying surfaces. It is normally stored in an atmosphere containing some toluene vapor, which keeps it in the most desirable condition for application. If it is stored dry, however, it may be reactivated satisfactorily by wiping it with a clean starch-free cheese cloth dampened with toluene. An alternate method of reactivation is to store loose film in toluene vapor for a few hours.

After detail parts are assembled they are placed in the curing fixture. The locating fixture described above is now used to apply pressure through its blocks to the stiffener flanges. Separate blocks are used to apply pressure to edges of doublers. It has been found that flexibility of these locating jigs is important to assure uniform distribution of loading between flanges when they are used to apply pressure. This assembly is then covered with a rubber blanket and the spaces under the flat skin and under the blanket are partially evacuated.

The next operation is the application of heat. The jig and parts are transferred to a heated curing oven or to the new type of fixture in which hot oil is circulated. The curing operation is not unduly critical. Complete cure is obtained by subjecting the joint line to a temperature of 320 to 350 F for a period of 25 to 35 minutes. If necessary for any reason, one or more additional curing operations do not damage the bond.

After completion of curing, parts are removed from the jig. Care is necessary in handling at this stage because, at the elevated temperatures used, magnesium alloy is somewhat susceptible to deformation. Also, since Metlbond joints have lower strength near the curing temperature, bonds can be damaged by careless handling. Completed parts are then thoroughly inspected for voids, delaminations, or other evidences of poor bonds.

(*Turn to page 84, please*)

To make

HARDENED & GROUND PARTS

Requires EXPERIENCE!

NOTHING we make tells a more complete story of quality than the king pin shown here—involving expert knowledge of materials; close-limit, intricate machining; scientifically controlled heat treatment; and micro-finish grinding. Result: A product in which both automotive manufacturers and ultimate users can have the utmost confidence.

Our specialization of over 40 years has earned us many satisfied customers among makers of trucks, tractors, trailers, buses, axles, off-the-road machines, and Diesel locomotives. We would like to have you consider Brown Hardened and Ground Parts for your own requirements. Please write or wire.

Henry W. Brown

PRESIDENT

Parts include . . .
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th-Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4¼" diameter.

THE BROWN CORP.

213 BELLEVUE AVE. SYRACUSE, N. Y.

C. H. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 5252 Broadway, Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Elmer L. Kingsland, 6888 Beechley Ave., Long Beach, Calif. • J. B. Hunt, E. L. Kingsland Co., 5611 S. E. Yamhill St., Portland, Ore.

Silicone News
DC
SILICONES
Dow Corning Silicone Insulation Saves Over $8,000 a Year on 44 Motors!
In the Saginaw Plant of Eaton Manufacturing Co., the output of four of these machines is stepped-up by stopping the 5 h. p., 3600 r.p.m. motors with a jolt of direct current as soon as 5 operations are performed on a small automotive part. With 105 starts and stops per hour, Class A insulated motors had an average life of only 8 days—32 failures for each of the 4 motors or a potential $10,000 a year in rewind costs alone.
Rewound with Dow Corning Silicone (Class H) Insulation, these motors now have a minimum life of 6 months; save Eaton a potential $8,000 a year plus a few hundred man hours of labor and some 40,000 parts that would have been lost due to down time.
DOWN TIME AND LOST PRODUCTION DUE TO MOTOR FAILURE ARE NO LONGER NECESSARY! Prove it in your own plant by having your hardest working motors rewound with Dow Corning Silicone Insulation. Call our nearest branch office for technical assistance or write to Dept. C-16.
Dow Corning Silicones Mean Business
DOW CORNING CORPORATION
MIDLAND, MICHIGAN
Atlanta • Chicago • Cleveland • Dallas
Los Angeles • New York
In Canada: Fiberglas Canada Ltd., Toronto
In Great Britain: Albright and Wilson, Ltd., London
FIRST in Silicones
Dow Corning

Among engineering materials the performance of *Dow Corning Silicones* sounds as fabulous as the tall tales told of Paul Bunyan or Mike Fink who claimed to be half-man, half-alligator . . .

The tall tales of the old frontier are reflected in skyscrapers . . . jet planes that disappear before you hear them . . . materials that are half inorganic, half organic. Fact has become more fabulous than folk tales. Here are a few of the fabulous facts about Dow Corning Silicones:

- DC Silicone (Class H) Insulation has at least 10 times the life of the best electrical insulating materials previously available. It also increases the power per pound ratio of electrical equipment by 100%.
- DC 44 Silicone Grease has at least 10 times the life of organic greases.
- Silastic*, the Dow Corning Silicone rubber, is serviceable at temperatures from −100 to +500° F.—an impossible assignment for any other kind of rubber.

The consumer is shopping for quality at a price. Management demands longer life, increased production and lower maintenance costs.

YOU NEED DOW CORNING SILICONES TO MAKE THE "IMPOSSIBLE" PRACTICAL

Write today for technical data on

DC SILICONE GREASES

Including relative bleed, evaporation and oxidation resistance of Silicone and organic greases, penetrometer, solidification and flash points; performance and application data.

DC SILICONE (CLASS H) INSULATION

Including results of accelerated life testing of Silicone (Class H) and Class B insulated motors; service life data on rewound equipment; and data on performance of equipment designed to capitalize on exceptional heat and moisture resistance.

*T. M. Reg. U. S. Pat. Off.

DOW CORNING CORPORATION, MIDLAND, MICHIGAN
Please send me ☐ Grease data sheet No. C-17.
☐ Silicone Insulation data sheet No. C-17A.

Name_____
Title_____
Company_____
City_____ Zone____ State_____

DOW CORNING CORPORATION, MIDLAND, MICHIGAN
Atlanta • Dallas • Chicago • Cleveland • Los Angeles • New York
In Canada: Fiberglas Canada Ltd., Toronto • In Great Britain: Albright and Wilson, Ltd., London

"They don't need an anchor—just a piece of slip-resistant 4-WAY Safety Plate."

For greater safety under foot,
in your plant and on your products

Inland 4-Way® Safety Plate

Adds Strength

Easy to Fabricate

Safe Footing

Easy to Clean

INLAND

INLAND STEEL COMPANY, Dept. A180
38 So. Dearborn St., Chicago 3, Ill.
Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis and St. Paul.

New Bulletin with New Ideas—Just Out! Bulletin F1. Complete engineering and application data. Send for it!

STOCKED BY LEADING STEEL WAREHOUSES

Complete assemblies containing magnesium alloy are next sent to the finish department, where one dip coat of zinc chromate primer is applied. When closed stiffeners are used, large drain holes are provided to permit both the interior and the exterior surfaces to be coated with this primer. This operation is not required for parts containing clad aluminum alloy only.

Completed parts are next sent to subassembly, where they are attached to the structure by conventional means such as riveting or bolting. Workers find Metlbonded assemblies easy to install, as they are normally simple in shape and because doublers are always provided at attachment points. Thickness is thus sufficient for a smooth riveting job.

Metlbond film used by Convair is at present made from nylon parachute cloth one ft wide which is first dipped in a tank of N2 cement, after which it passes through a large heated box to evaporate the solvent. Then it continues through a tank of M3C cement, after which it is again dried in the same heated box. This is a continuous operation, with the completed film coming from the box at a speed of approximately one fpm. The film is also available commercially from Narmco, Inc., of Costa Mesa, Calif., which can supply it in widths varying from tape a fraction of an in. wide to sheet 36 in. wide. Metlbond film obtainable from Narmco at present uses Fiberglas cloth instead of nylon as a base.

Welding Electrodes

An addition to the line of low hydrogen welding electrodes is announced by Arcos Corp., Phila., Pa., in their development of three high-strength steel "Tensilend" electrodes which require no preheat—even when welding in below-freezing temperatures.

Three grades are being introduced: Tensilend 70 with a typical tensile strength of 70,000 psi; Tensilend 100 for steels in the 100,000 psi class; and Tensilend 120 for 120,000 psi steels. It is expected that Tensilend 70 with its stainless type coating and high tensile weld deposits will have the broadest application. In addition to its advantages in welding low alloy high strength steels, it can be used to weld high carbon steels. The possibilities of Tensilend 120, developed to weld marine armor plate, are still being explored.

These low hydrogen electrodes leave a mild steel deposit, but are claimed to differ from any mild steel electrodes in possessing higher tensile strength, better elongation, and better impact strength at both room and sub-freezing temperatures. In addition, they eliminate underbead cracking.

Features are the high temperature baking to drive off moisture, and the packaging which prevents moisture absorption before use.

first

in the field...

HARRISON OIL COOLERS for Automatic Transmissions

Harrison has kept pace with the automotive industry by developing effective oil coolers for the new transmissions. It has built more of these cooling units than any other manufacturer in the field.

For each application, Harrison designs an oil cooler exactly fitted to its task—just right for the rate of flow, pressure, and temperature range. Then Harrison's manufacturing know-how produces coolers that are compact, light and dependable.

If you have a transmission oil cooling problem, consult Harrison. Facilities include complete engineering laboratories for testing designs under accurately controlled conditions. Harrison Radiator Division, General Motors Corporation, Lockport, N. Y.

HARRISON

RADIATORS, THERMOSTATS, HEATERS, DEFROSTERS, OIL COOLERS

Electronic Brain

(*Continued from page 47*)

assembly plants as well. Flint accounts for perhaps 40 per cent of all assembly operations, the rest being handled in the B-O-P plants. The Flint plant does all of the manufacturing, however, and the specific problem is to provide the Buick warehouse with a daily schedule of parts and assemblies for shipment to the assembly plants.

These instruction are issued on IBM cards, Fig. 2. As shipments are made, there is the problem of identifying the material in each freight car and providing a tally suitable for billing and preparation of bills of lading. Moreover, the job has to be done quickly so as to follow each shipment without delay.

The essential information on this IBM card covers the following: Part number and name; quantity; unit weight; total weight.

However, since the total weight to be paid for represents the combination of parts weight and container weight, and since containers vary widely both in size and type, the type and number of containers in each shipment must be known. To this end, as shipments are completed, the warehouse returns the cards with notations giving the container code and number of containers for each lot.

When the computer is set up with the proper arrangement of circuits to digest the information on this card, it makes the extensions giving the total weight of parts, calculates the weight of the containers, and adds the two to give the total weight. This is followed by summation of the total weight on all of the cards constituting a carload.

In addition to the data described above, Fig. 2 also gives an added bit of valuable information. The first vertical column at the right is titled "car location." This code tells the consignee the exact area of the car in which the particular container has been packed. In certain cases where a part is required in a hurry it can be readily reached without waiting to unload the entire contents.

The two specific cases described above will give some impression of the versatility and capability of this new marvel of science. It remains for advanced management to study the equipment and uncover the many applications which may be handled with facility and economy.

Mechanical Tappets
Hydraulic Tappets
Oil Pump to Distributor Shafts
Rocker Arm Shafts
Water Pump Shafts
Flywheel to Crankshaft Screws
Adjusting Screws
Cylinder Head Cap Screws
Main Bearing Cap Screws
Differential Carrier Screws

Cylinder Head Studs
Main Bearing Studs
Wheel Bolts and Studs
Push Rods
Retainers
Connecting Rod Bolts
Automatic Transmission Valves
Hydraulic Cylinder Pistons
Diesel Energy Cells
Remote Control Levers

Special Screw Machine Parts 1/16" to 5" Diameter, Plain or hardened and ground ● Cap Screws ● Set Screws ● Nuts ● Studs ● Taper Pins ● Socket Screw Products ●

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

British Racing Car

(*Continued from page 45*)

and encase the triplex roller drive chains.

Each of the cast assemblies is carried on needle bearings and extends rearward to a Lockheed air strut. Driving sprockets are mounted on ball bearings, and driven sprockets are splined to short shafts carried in roller bearings and extending through the case. Flanged outer ends of the short shafts carry the rear wheels. A stabilizer bar is connected to the two assemblies. To reduce unsprung weight, the rear brake is mounted on an extension of the worm shaft rather than at the rear wheels. With this suspension system, caster angle and track remain constant regardless of up and down motion of the wheels.

Lockheed air struts are used for springing at the front end as well as at the rear. They are connected to short inner arms extending forward from the trailing links of the front suspension. Front brakes are hydraulically actuated and feature a design which eliminates the need for backing plates, thus leaving shoes and operating mechanism exposed to the air.

In general, design of other components of the car follows conventional race car practice. The 120 cu in. supercharged engine develop approximately 320 hp at 6500 rpm. With its light alloy body, the car weighs just under 1800 lb.

IT CARRIES A PAYLOAD OF 100 TONS ON BEAMS OF MAYARI R

Rogers Brothers trailer built of Mayari R. Deck measures 12 ft by 20 ft and has a capacity of 100 tons. Tandem axles at the rear are carried on 16 tires. The front has rocking side members and is carried on 8 tires. Draw-bar is 12 ft long. Both front and rear are equipped with air brakes.

This 100-ton-capacity gooseneck trailer is a good example of how Mayari R low-alloy, high-strength steel is used to improve the design of heavy-duty equipment.

Because of the high mechanical properties of Mayari R the builders were able to design the trailer for a live load of 100 tons without the use of unduly heavy structural members. Deadweight was held to the minimum and the possibility of overloading any of the 24 trailer wheels was eliminated. The main beams are 12 by 12 Mayari R wide-flange shapes weighing 190 lb per ft; center and cross members are 12 by 6½ Mayari R shapes weighing 36 lb per ft; rear splice members are 14 by 10 Mayari R shapes weighing 68 lb per ft. Welded construction was used throughout.

This versatile steel provides the higher strength and better resistance to atmospheric corrosion, as well as resistance to abrasion and piercing needed in all types of trailers, trucks, tankers and other vehicles subjected to hard usage.

Full information on the applications and properties of Mayari R is readily available. Write or call any of our sales offices for a copy of Catalog No. 259.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

Mayari R *makes it lighter... stronger... longer lasting*

Another NEW SUNDSTRAND RIGIDMIL

Model 55 With Mechanical Feed Available in Simplex, Duplex or Triplex Types

You'll find the right size and type of milling machine for your work in Sundstrand's complete line. For instance, the Model 55 Rigidmil illustrated has spindle motors ranging from 25 to 50 horsepower. Like most all standard Rigidmils, it can be provided in simplex, duplex or triplex types. Further versatility can be provided through the application of special heads, vertical feed to heads, second rate of feed, special heads, automatic index base, etc. A conference with one of our engineers and Sundstrand "Engineered Production" will determine the type and machine arrangement best suited to your work. There is no obligation for this service.

Brief Specfications

Complete specifications of the Model 55 vary according to type of arrangement, i.e., simplex, duplex or triplex. However, basic standard specifications in brief are as follows:

TABLE:

Feed Stroke, inches.....72, 96, 120, 144 or 168
Table Widths, inches.....18, 24, 30, 36 or 42
Feed Rates, inches per min.....½ to 50
1 to 100

SPINDLE:

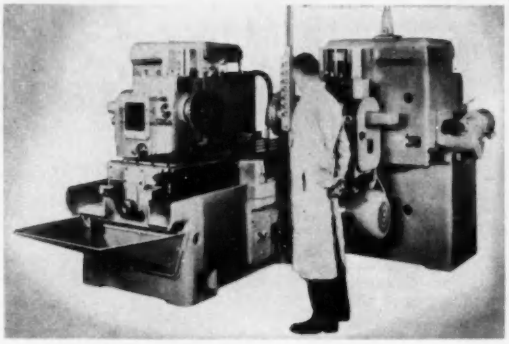
Endwise quill adjustment..... 8″
Vertical Adjustment.....5¾″ min., 20″ max.
(from spindle center to top of table) or 5¾″ min., 30″ max.

Spindle Nose.....No. 50
Spindle Speeds, rpm.....25 to 100 (in 2 models)
Spindle Motor.....25 to 50 hp

For additional information on all Sundstrand Rigidmils and Sundstrand "Engineered Production", write for literature.

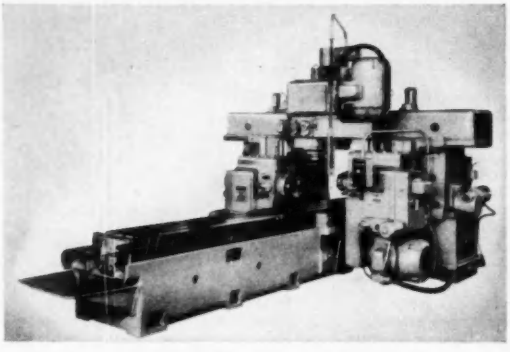
SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



Duplex Type

Pictured above is the Model 55 with two horizontal opposed independently motor driven heads. Each spindle is mounted in a quill and has 8″ endwise adjustment. Spindle heads are mounted on adjustable columns, and power adjustment is provided for cross movement. Power clamping and unclamping is also provided for these moving members. Machine illustrated is used for finish milling both ends of a cylinder block. Cutters used are 14″ dia. carbide face mills.



Triplex Type

This highly productive Sundstrand Rigidmil has been developed to add flexibility to a production type milling machine so that both wide and narrow parts can be machined without sacrifice in accuracy. Three spindle heads, one vertical and two horizontal, can be adjusted to mill three sides of a work piece simultaneously or operate individually. Heads are independently motor driven. Machines can be furnished in table widths of 18″, 24″, 30″, 36″ and 42″ and feed strokes up to 168 inches with larger or special sizes available on request.

FREE DATA on all Standard Rigidmils and Sundstrand "Engineered Production" will be sent on request. Ask for Bulletin 298 for specific additional information on the new Model 55 Rigidmil.

Features

Among the many features of this new Model 55 Rigidmil are the following:

100 TO 1 RATIO FEED RANGE... Mechanical feed box with 100 to 1 ratio between high and low feed rate drives table feed screw. Feed box is of Sundstrand's patented design having two different driving gear shafts which greatly increases the range between the high and low feed rate and makes possible four different feeds with each set of two feed change pick-off gears. Two standard feed ranges of ½″ to 50″ or 1″ to 100″ per minute are optional. Dial or push button control of feed changes can be furnished as extra equipment.

CLIMB AND CONVENTIONAL MILLING... Addition of back-lash eliminator (standard) to table screw makes possible the positive feed necessary for climb milling.

SCREW FEED TO TABLE

SQUARE TYPE TABLE WAYS

HARDENED AND GROUND STEEL TABLE WAYS

AUTOMATIC LUBRICATION . . . All moving parts within machine are automatically lubricated. Easy to read sight gages permit quick check of oil levels in reservoirs.

30 TO 1 RATIO SPINDLE HEADS... The spindle heads also have two drive gear shafts. Thus, a much wider speed range can be obtained, and each set of two speed change gears provide four speed changes instead of the usual two speed changes. Heads of different horsepower capacities and speed ranges are available for this machine.

UNUSUALLY HEAVY SPINDLE . . . has heavy duty precision type front, intermediate and rear bearings.

AUTOMATIC TABLE CYCLES

EASY CHIP REMOVAL

ADJUSTABLE DWELL MECHANISM . . . For One Or Both Ends Of Table (Extra).

SECOND RATE OF FEED... For One Or Both Ends Of The Table (Extra).

VERTICAL POWER MOVEMENT... For Head (Extra).

VERTICAL FEED TO HEAD... (Extra).

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MACHINE TOOL COMPANY
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DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

PRECISION STAMPINGS
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DIAMOND G STAMPINGS
CUT COSTS... TIME
SAVE EQUIPMENT
Let our "know-how" and modern equipment save you dollars and time in getting metal stampings. We specialize in small and medium size stampings and produce them to precise specifications at minimum cost.
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...delivers them when you need them . . . where you need them.
OTHER GARRETT PRODUCTS
Lock washers . . . flat washers . . . spring stampings . . . snap and retainer rings . . . hose clamps.
Manufactured by
GEORGE K. GARRETT Co., Inc.
Philadelphia 34, Pa.
GARRETT
OF
PHILADELPHIA

10 Speed Transmission

(*Continued from page* 44)

Shift Position	Ratio	High Range Speed (mph)	Percentage Step
Tenth	1.00-1	60	
Ninth	1.266	47½	26½
Eighth	1.64	36½	29¼
Seventh	2.10	28½	28
Sixth	2.73	22	30

From this it is obvious that the vehicle can be operated at the governed engine speed through the entire range of 60 to 22 mph without shifting of the auxiliary. At this stage the speed of the auxiliary main shaft is the same as that of the front shaft.

If operating conditions indicate the need for shifting to low range, the speed of the auxiliary main shaft will become the speed of the front main shaft divided by the low range reduction of 3.55 for each of the five speeds. The speed of the propeller shaft is always the same as the speed of the auxiliary main shaft. In the example described above, the shift into low range will give the following results:

Shift Position	Ratio	Low Range Speed (mph)	Percentage Step
Fifth	3.55	17	30
Fourth	4.49	13½	26½
Third	5.82	10½	29½
Second	7.45	8	28
First	9.70	6	30

Synchronizers are provided for both direct drive and main shaft low speed gear in the auxiliary. Pressure is applied to the selected synchronizer through a yoke mounted on a shift rod and actuated in either direction by a two-way power cylinder, using either compressed air or vacuum. The end of the cylinder to which power is applied is controlled by a solenoid-actuated valve, the solenoid being controlled by the button on the gear shift lever.

Since it is desirable to pre-select the auxiliary shift before starting to shift the front transmission to a faster or slower ratio, provision is made to prevent an auxiliary shift after pre-selection and before the front transmission is in neutral. This is done by breaking the electric connection from the battery to the switch by means of a microswitch which remains open whenever the transmission is in gear and closed when in neutral.

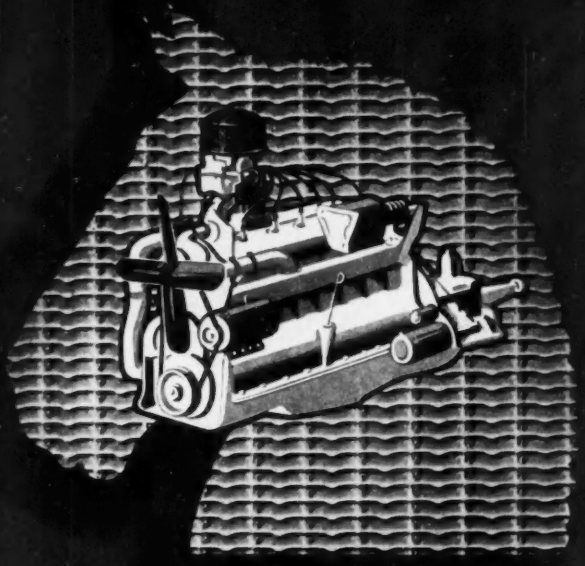
It is apparent that shifts of the auxiliary from one range to another involve shifts from direct to a reduction of 3.55 to 1; or from 3.55 to 1 to direct drive. In shifting from low to direct in the auxiliary, the speed of the front unit main shaft is slowed down to the speed of the auxiliary main shaft because of the direct connection between the two shafts. Since the auxiliary main shaft is connected to the axle by the propeller shaft, the inertia of the entire vehicle is made available for slowing down the speed of the front main shaft when it is in neutral.

With a conventional transmission,

(*Turn to page* 92, *please*)

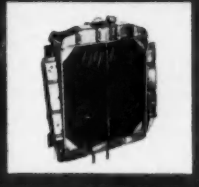
WITTEK
NOC-OUT
HOSE CLAMPS
The Standard of the Automotive Industry
Type A—Radiator Hose Connections
Type G-BB—Booster Brake Hose Connections No. G-B-HH for Hot Water Heater Hose
Type HP—High Pressure Hose Connections
Wittek Noc-Out Hose Clamps are designed in a variety of types made in many sizes for use by the automotive industry. Because they provide the most practical leakproof hose connection, they are specified by the leading manufacturers as standard, original equipment for automobiles, buses, trucks and tractors.
Write for descriptive literature.
Automotive HOSE CLAMPS
WITTEK
MANUFACTURING CO.
4319 W. 24th Place, Chicago 23, Ill.
Dependability in Hose Clamps for Over a Quarter of a Century

ENGINEERING
B-W
PRODUCTION



HOW TO KEEP 100 "HORSES" *Cool*

BALANCE does it . . . in B-W Long Radiators



It takes a lot of radiator cooling surface to dissipate the heat generated by the 100 or more "horses" in automobile engines. The trick is to do it with a properly balanced cooling system . . . without excessive radiator size or weight.

Borg-Warner's Long Manufacturing Division does it through the use of light weight materials and skillfully engineered design of heat transfer surfaces. The result is an unusually compact radiator with more than 25,000 square inches of cooling surface in a core only 19 inches wide, 22 inches high, 3 inches deep.

B-W's Long Manufacturing Division not only keeps abreast of industry demands, but constantly looks ahead to future unprecedented cooling requirements. That's the way all 23 Borg-Warner Divisions work in serving the automotive industry . . . and America.

B-W *Engineering makes it work*

B-W *Production makes it available*

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B-W
PRODUCTION

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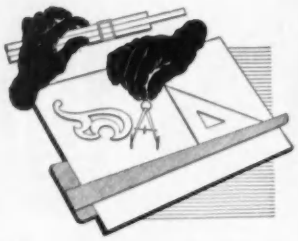
THESE UNITS FORM BORG-WARNER, *Executive Offices, Chicago:* BORG & BECK • BORG-WARNER INTERNATIONAL • BORG-WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FRANKLIN STEEL • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER CARBURETER • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • NORGE • NORGE-HEAT • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.



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For specifying a steel machinery part, the designer and the metallurgist make a fine team.

If the part is properly designed (and this means taking the metallurgical treatment into account) the choice of a steel and its proper treatment become relatively simple.

So important are these aspects of good and poor design of parts in relation to the choice of steel and its treatment—the work of the designer and the metallurgist—that we have compiled a 70-page book on this subject, giving many sketches as examples. "THREE KEYS TO SATISFACTION" is interesting and helpful to designers and metallurgists; it is free on request.

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MOLY

AI-8

shifts to a slower ratio make it desirable to speed up the slower gear relative to the main shaft by accelerating the engine with clutch engaged while the transmission is in neutral. With the Roadranger, on the other hand, partial synchronization in the front section is obtained by slowing down the front main shaft as described above. Actually since the ratio change in the auxiliary is greater than the entire range of the front transmission, the front main shaft is slowed down below the speed of the gear to be engaged in the front unit. Consequently, the shift in the front box has the characteristics of an up shift.

For example, if the auxiliary is shifted from low to direct, and the front unit from direct to 2.73, the resultant effective ratio change is from 3.55 to 2.73, a step of 30 per cent. Thus the shift is handled like any 30 per cent up shift.

Now consider an auxiliary shift from direct into low. Here the front main shaft is speeded by 3.55. Since the speed of the propeller shaft under this situation is controlled by the inertia of the entire vehicle and since the resistance of the front main shaft to a speed increase is represented only by the inertia of the shaft itself, the accommodation occurs quickly.

With conventional transmissions, shifts to a faster ratio require the faster gear to slow down while the transmission is in neutral. With the Roadranger, on the other hand, partial synchronization in the front section is obtained simply by speeding up the front main shaft as described. Again, since the ratio change in the auxiliary is greater than the entire range of the front unit, the front shaft is speeded faster than the gear to be engaged, hence, the shift in the front section has the characteristics of a down shift.

When the auxiliary section is shifted from 3.55 to 1 reduction to direct drive, the front section should also be shifted to a slower ratio. When shifting the auxiliary from direct drive to 3.55 to 1 reduction, the front section should also be shifted to a faster ratio. The corresponding shifts in the unit section should always be coincidental with auxiliary shifts unless an overall ratio change of 3.55 to 1 in either direction is required by the particular operating condition.

British Ford Program

(*Continued from page* 45)

French Ford operations show a loss of about $260,000 for the year 1949. This is attributable to special expenditure in connection with the production of the Vedette passenger cars and the Hercules truck. Both these are now in full production and sales are rising rapidly. President and general manager of the French Ford is now François Lehideux, who for a number of years was commercial director of the Renault Company before nationalization.

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• And again it is Layne and Layne alone who can offer the services of eleven strategically located Associated Companies, each of which is widely experienced and fully capable of—and has made installations of all sizes.

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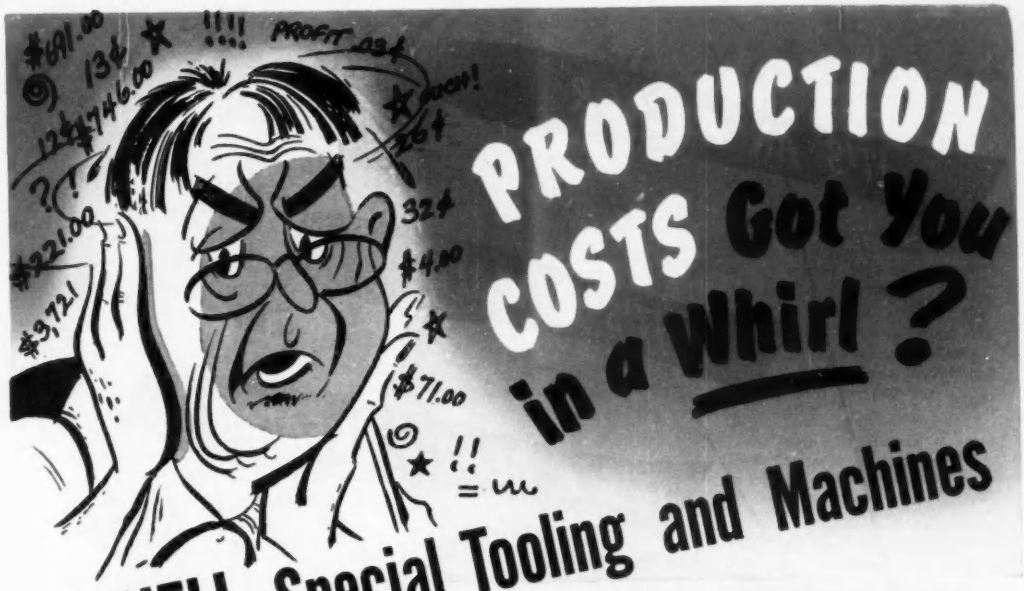

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CAN HELP YOU

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- IMPROVE QUALITY
- REDUCE COSTS

If high production costs are giving you a headache . . . if you need to produce parts faster, better, cheaper . . . Bunell may have some answers for you! For 30 years we've been helping leading manufacturers solve tough production problems.

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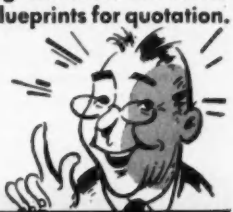
Consult Bunell on your production problems. You can benefit by using our services. Write today or send your own blueprints for quotation.

WRITE FOR CATALOG *which describes BUNELL services, facilities and equipment.*



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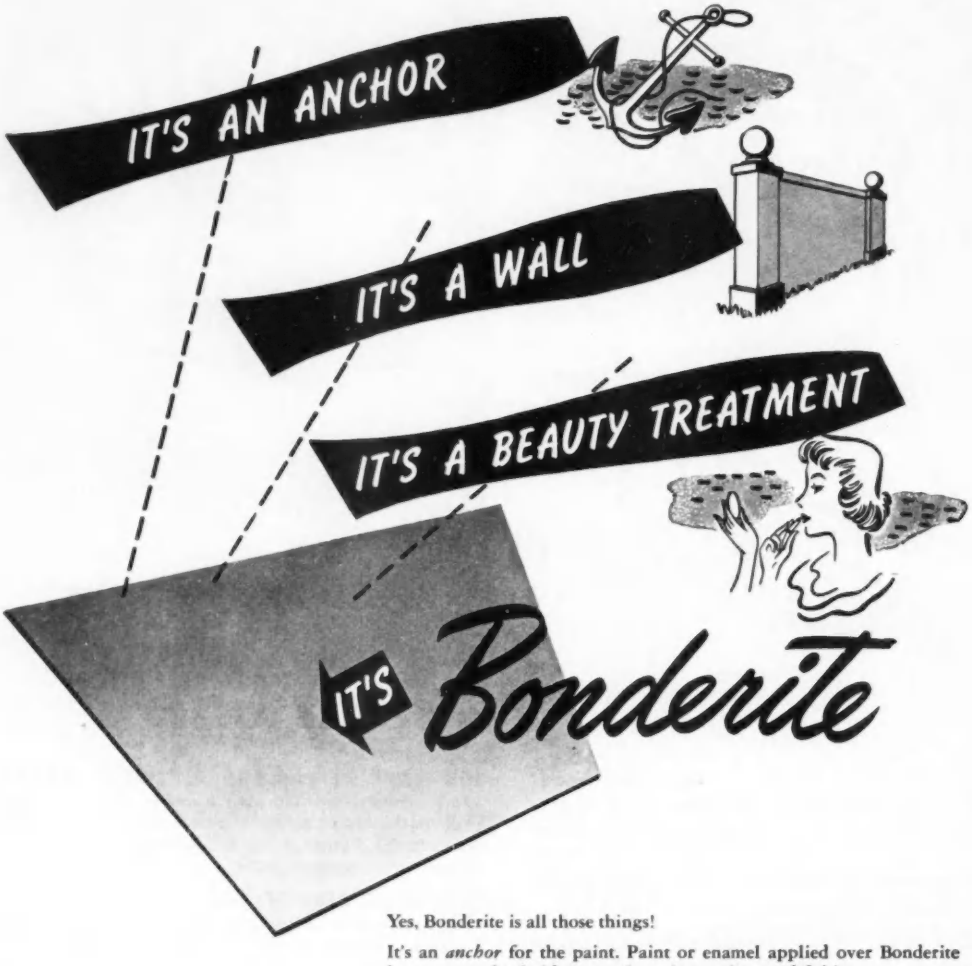

Yes, Bonderite is all those things!

It's an *anchor* for the paint. Paint or enamel applied over Bonderite has a secure foothold. It stoutly resists peeling and flaking.

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It's a *beauty treatment!* Bonderite, under the paint, acts to preserve and protect the appearance of the finish through long service.

It is used by manufacturers who want lasting fine finish on metal. Most automobiles are treated with Bonderite. So are the great majority of refrigerators, washers and other domestic appliances. It is a product improvement used on hundreds of metal products as a corrosion-resistant paint base.

Bonderite is a *sales-feature*, too. Buyers know and appreciate the value of this paint-holding process.

Learn what Bonderite can do for your product. Write today for full information.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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This precision instrument, expressly designed for production gaging, has proven itself since 1945 in checking all forms of threads including critical aircraft threads . . . and is now available to producers of external threads from 0 through 3⅛" diameter, coarse or fine pitches, in all classes. (Class 5 should be specifically requested.)

The indicator tells at a glance whether your product is over-size, undersize, eccentric, tapered, or if lead error exists. The work is recorded visually to accepted ring gage tolerances thus eliminating the human error-possibility of "feel".

Checking up to 20 pieces per minute . . . 3 minutes to change thread dia. units . . . means lower costs, greater flexibility, for both production and inspection departments.

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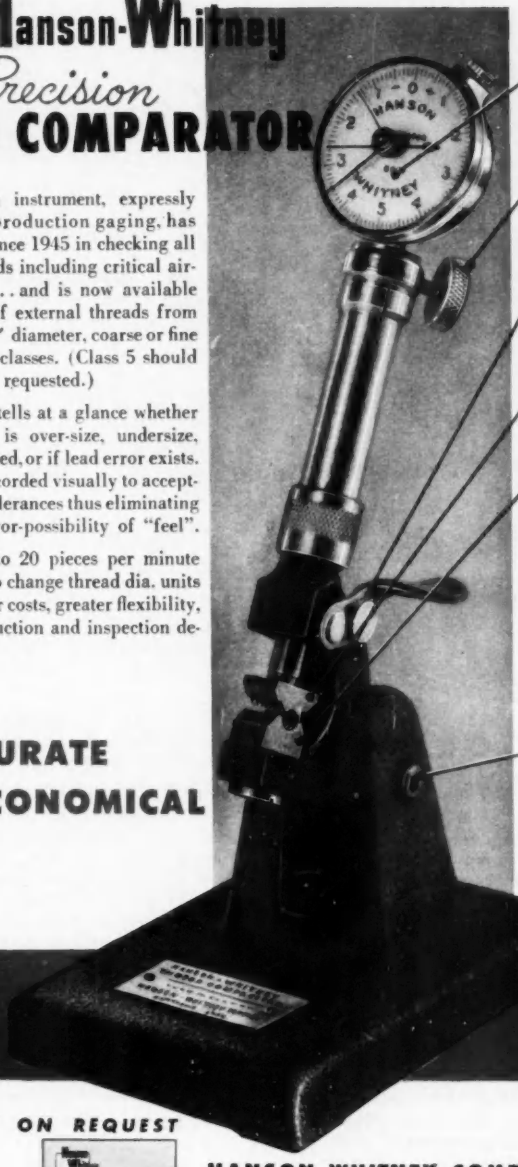

1. Indicator is equipped with tolerance hands and is graduated in tenths of thousands. Any type indicator with ⅜" shank may be used.

2. Comparator easily set to desired reading by loosening knob and lowering indicator. Tighten knob screw to lock indicator in correct position.

3. Lever controls positioning of upper anvil. Can be easily raised or lowered to insert or remove work. This action eliminates excessive wear on anvils.

4. Comparator is easily set — insert setting plug, lower upper anvil. Set indicator at tolerance required.

5. Thread anvils are actually a split internal thread member to check assemble-ability and to give exact reading on indicator dial of part checked within .0002 accuracy. Anvil core hardened to 60-62 "C". Standard unit will check any P.D. from class 1 to 4 and only one set plug (of known P.D.) is required for all classes.

Standard recognized 2½ lb. pressure is maintained on work to hold it in reading position, eliminating human element while taking reading.

6. Complete gaging unit may be removed by loosening screw for change in size setting. Can also be used after removal for checking parts on machine. Complete removal and resetting accomplished in less than three minutes.

BULLETIN ON REQUEST

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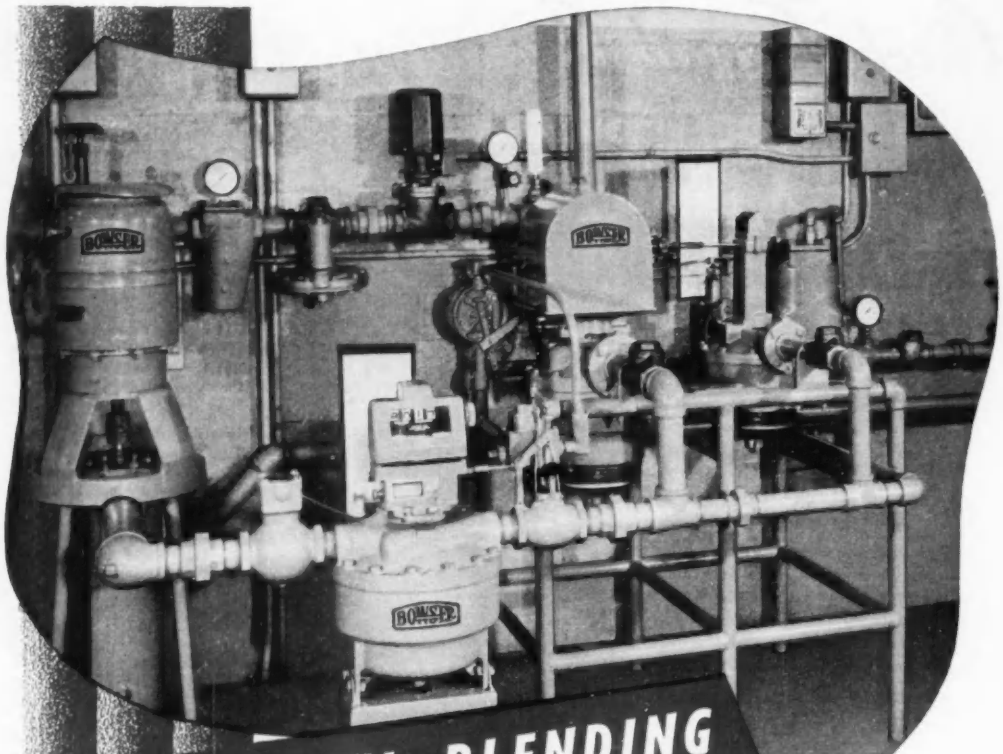
Bulletin shows detailed various parts of the H-W Comparator (all available separately). Send for your copy today.

SHW50



SOLUBLE OIL BLENDING at Caterpillar

REG. U. S. PAT. OFF.

Here soluble oils from bulk storage are accurately blended with city water in any desired proportion for both cutting and grinding operations.

In a few minutes this Bowser automatic system blends a day's supply and pumps it any distance to the department which uses it . . . in some instances pumping direct to the machine sump, as needed. Homogenization is so thorough that batches can be prepared a considerable time ahead of use.

Best of all, human carelessness and guesswork are eliminated from this important job. Constantly uniform, correctly proportioned blends assure better work, longer tool life and less downtime.

By maintaining a continuous, accurate record of all soluble oils and water used, an accurate check is provided on costs as well as a double-check on the proportionate quantity of each liquid. The total finished blend is also indicated.

Similar Bowser systems are used in many plants for automatically blending sulphurized cutting oils and other industrial lubricants.

Continuous blending speeds up to 300 g.p.m. . . . ingredient proportions in any increment of .5%.

Write today for Bulletin 402 . . . the complete story on Bowser oil blending systems.

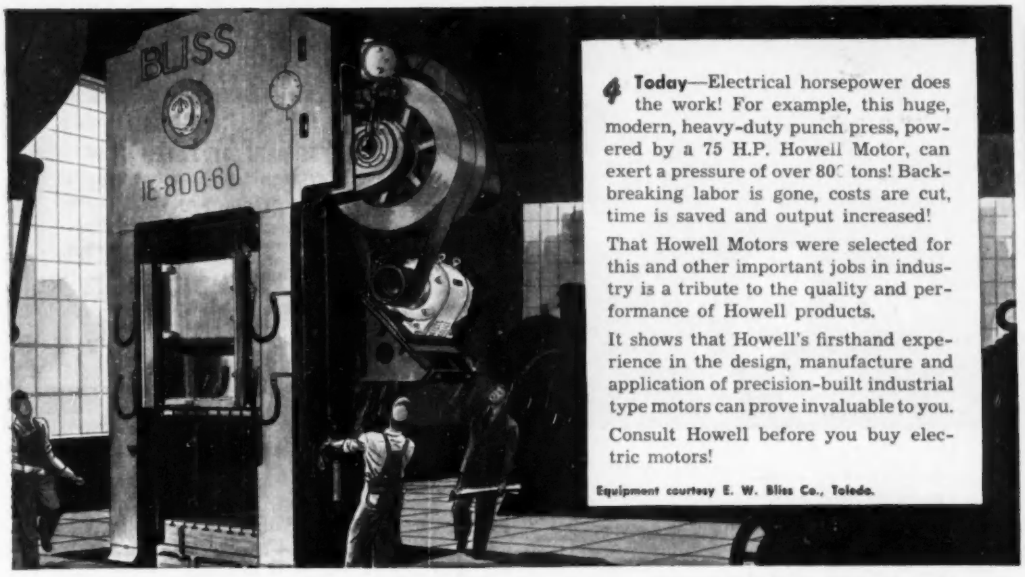
BOWSER, INC., 1347 Creighton Ave., Fort Wayne 2, Ind.

1 1600—Man worked hard for his pay in these days. Crude machines like this began to lighten his load by replacing laborious handwork with foot power. But progress was really only beginning.

2 1875—By accident, it was discovered that if two direct current dynamos were connected together, one would serve as a generator and drive the other as a motor. Electrical horsepower was here!

3 1900—Result: Electrical horsepower replaced foot power! By 1915, Howell "Red Band" Electric Motors arrived. Soon, these rugged, industrial type motors were widely accepted in many industries.

NOW...A PUNCH PRESS WITH A PUNCH!



4 Today—Electrical horsepower does the work! For example, this huge, modern, heavy-duty punch press, powered by a 75 H.P. Howell Motor, can exert a pressure of over 80[illegible] tons! Back-breaking labor is gone, costs are cut, time is saved and output increased!

That Howell Motors were selected for this and other important jobs in industry is a tribute to the quality and performance of Howell products.

It shows that Howell's firsthand experience in the design, manufacture and application of precision-built industrial type motors can prove invaluable to you.

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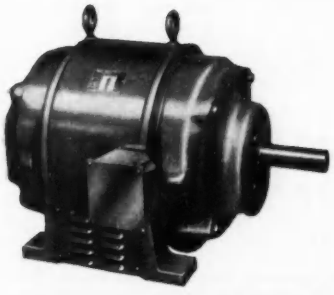

Howell Type F Punch Press Motor

HOWELL MOTORS

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Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

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with extra low pressure tires

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You actually do your customers a real favor when you sell them complete sets of the correct combination of extra low pressure tires and Kelsey-Hayes 15" change-over wheels. Ask your Kelsey-Hayes distributor for a copy of the booklet "Riding 15" Wheels to a Fortune." It shows how and why the most successful tire dealers are those who sell "change-overs".

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Cross-Crawford Wheel & Rim ..... Birmingham 2

CALIFORNIA
Motor Rim & Wheel Service ..... Los Angeles 15
Motor Rim & Wheel Service ..... San Francisco 9

COLORADO
Quinn & McGill Motor Supply ..... Denver 1

CONNECTICUT
Connecticut Wheel & Rim ..... Hartford 6
Connecticut Wheel & Rim ..... New Haven 11

FLORIDA
Southeast Wheel & Rim Co. ..... Jacksonville 3

GEORGIA
Harris Automotive Service ..... Atlanta 3

ILLINOIS
Stone Wheel Incorporated ..... Chicago 16
Peoria Wheel & Rim Company ..... Peoria 3
Illinois Wheel & Brake Company ..... Springfield

INDIANA
Wheel and Rim Sales ..... Fort Wayne
Indiana Wheel & Rim Company ..... Indianapolis 2
Wire & Disc Wheel Sales ..... South Bend 18

IOWA
Stone Wheel Incorporated ..... Davenport
Des Moines Wheel & Rim Co. ..... Des Moines 10

KANSAS
Barbash-Young & Company ..... Wichita 2

KENTUCKY
Auto Wheel & Rim Service ..... Louisville 3

LOUISIANA
Southern Wheel & Rim Co. ..... New Orleans 13

MARYLAND
R. W. Harris & Sons Inc. ..... Baltimore 2

MASSACHUSETTS
New England Wheel & Rim Co. ..... Boston 15

MICHIGAN
Rim & Wheel Service ..... Detroit 2
Rim & Wheel Service ..... Grand Rapids 3

MINNESOTA
Pioneer Rim & Wheel Company ..... Minneapolis 4

MISSOURI
Barbash-Young & Company ..... Kansas City 8
Barbash-Young & Company ..... Springfield
Barbash-Young & Company ..... St. Louis 8

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Wheels, Incorporated ..... New York 22
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Carolina Rim & Wheel Co. ..... Charlotte 1
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Pioneer Rim & Wheel Co. ..... Fargo

OHIO
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Rim & Wheel Service ..... Cincinnati 2
Motor Rim Manufacturers ..... Cleveland 1
Hayes Wheel & Spring Service ..... Columbus 15
Rim & Wheel Service ..... Dayton 3
Wheel & Rim Sales Company ..... Toledo 1

OKLAHOMA
Southwest Wheel Inc. ..... Oklahoma City 1

OREGON
Auto Wheel Service ..... Portland 9

PENNSYLVANIA
Standard Wheel & Rim Co. ..... Harrisburg
Thomas Wheel & Rim Company ..... Philadelphia 30
Wheel & Rim Sales Company ..... Pittsburgh 12

RHODE ISLAND
New England Wheel & Rim Co. ..... Providence 3

TENNESSEE
Harris Automotive Service ..... Knoxville 17
Beller Wheel Brake & Supply ..... Memphis 3
Beller Wheel Brake & Supply ..... Nashville 3

TEXAS
Southwest Wheel Inc. ..... Dallas 1
Southwest Wheel and Equipment Co. ..... Houston 2
Southwest Wheel and Equipment Co. San Antonio 6

UTAH
Henderson Rim & Wheel Serv. ..... Salt Lake City 1

VIRGINIA
Dixie Wheel Company ..... Richmond 20

WASHINGTON
Motor Wheel & Parts Co. ..... Seattle 22
Bearing & Rim Supply ..... Spokane 2

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PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

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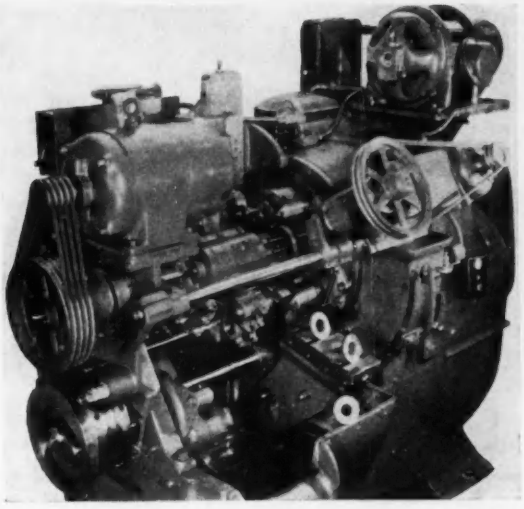
Has VERSATILITY

You can combine turning, drilling, tapping, threading, milling, etc., operations.

TRY "Baird" for high production of Automotive Parts requiring finely finished surfaces and close limits.



For Instance:

The picture shows a tool set-up to turn the O.D. and top of a small piston and then cross drill the wristpin hole in the piston in a located position, in one handling and the same machine tooled to turn and then drill the six holes in the cylinder cover plate shown in the picture.

Some of the EXCLUSIVE FEATURES which have made the Baird 7 Six-Spindle Horizontal Indexing Lathe outstanding are:

- INDEPENDENT TOOL SLIDES
  The longitudinal tool slides may have different strokes and the cross slides are independent and have their strokes, all as best suits the job. All tool slides have micrometer adjustment.

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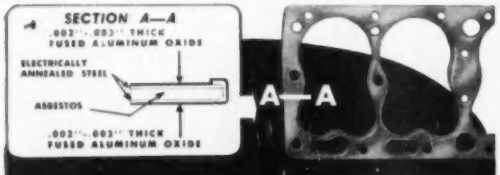

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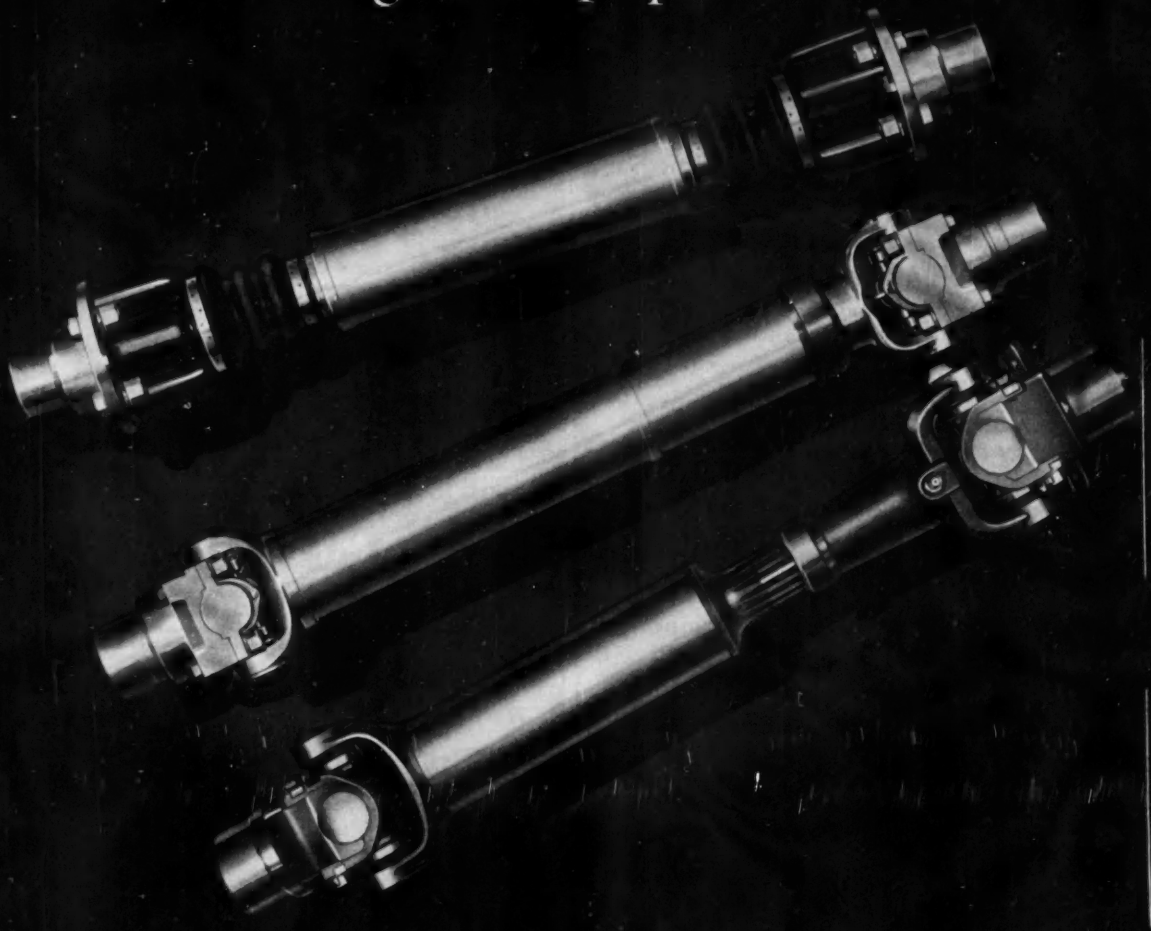

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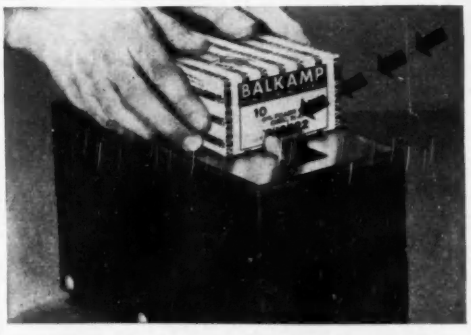

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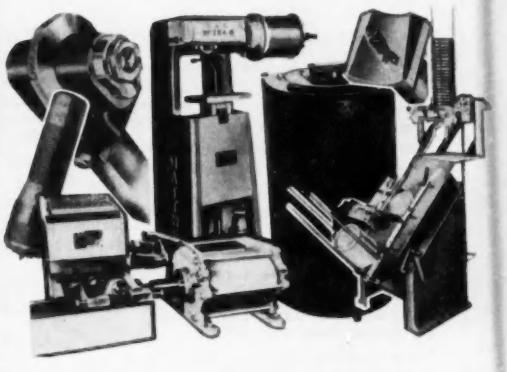

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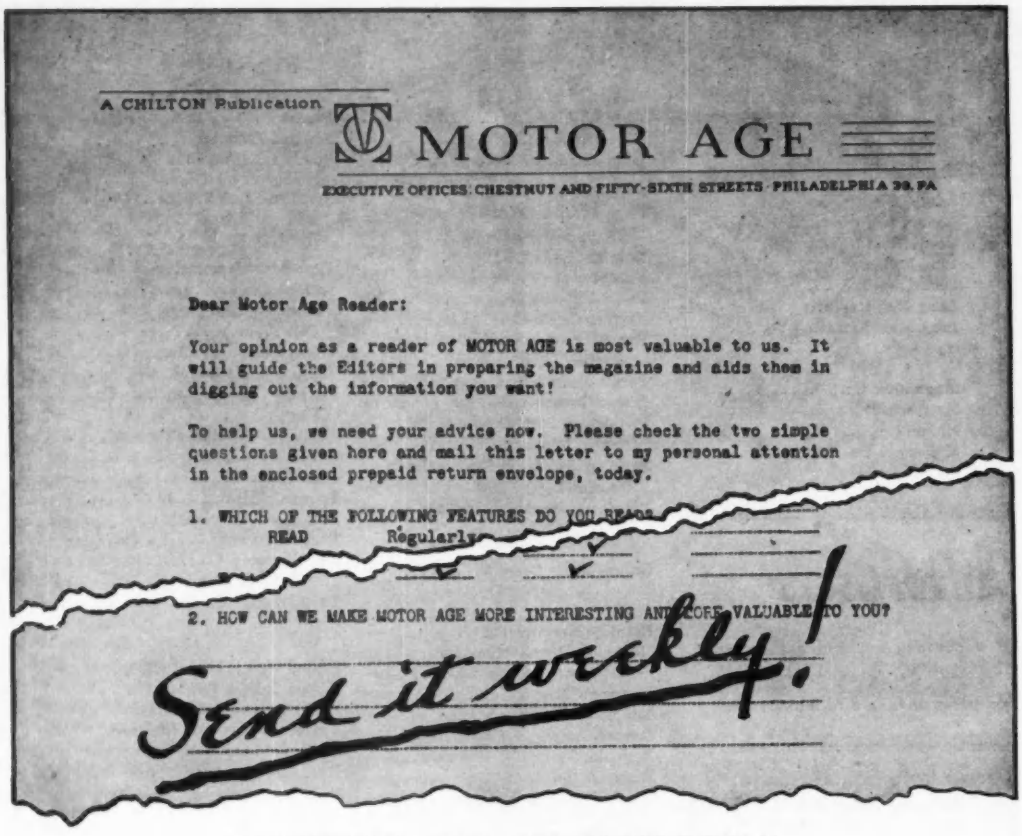
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